



# FreeWave Tool Suite

Release 2.8

## User Manual



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## Safety Information



**Warning! Do not** remove or insert diagnostics cable while circuit is live.

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2. If Product is used outside of FreeWave specifications as stated in the Product's data sheet.
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## Document Revision History

Date	Rev Letter	Updates Made
03/02/2012	C	Added information about not using the Network Diagnostics application to poll multiple networks at a time, or a single network continuously, along with other best practices. For more information, see "Network Diagnostics Application" on page 43 and "Network Diagnostics Best Practices" on page 44.
12/22/2011	B	Added information about data backups, a new feature in version 2.8.5. For more information, see "Data Backups" on page 9.
08/02/2011	A	<p>Added documentation for the following new features in version 2.8:</p> <ul style="list-style-type: none"><li>• Using the new Modbus Interface application and the pre-defined register maps to monitor devices that use the Modbus protocol. "Modbus Interface Application" on page 85</li><li>• Exporting a network to a SQL Server database. See "Exporting Networks" on page 16.</li><li>• Tool Suite 2.8 requires SQL Server Compact 3.5 Service Pack 2. See "Installing and Upgrading Tool Suite Software" on page 1.</li></ul> <p>Updated document organization and structure:</p> <ul style="list-style-type: none"><li>• The document now contains a Preface and an Introduction chapter that explains the Tool Suite navigation components.</li><li>• Each application in Tool Suite is now contained in its own chapter.</li><li>• Sections are now task oriented for improved readability and use.</li></ul>



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# Preface

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FreeWave Tool Suite is a program that provides easy, reliable, and repeatable programming and monitoring tools for FreeWave Technologies, Inc. wireless data transceivers, I/O Serial Base devices, and Expansion Modules. The following applications are available from within Tool Suite:

- **Configuration** - Use this application to program devices according to specific network requirements.
- **Network Diagnostics** - Use this application to view performance data in real-time from your network.
- **Local Diagnostics** - Use this application to view a real-time snapshot of MultiPoint setups that measure the signal-to-noise level of a device .
- **Spectrum Tool** - Use this application to monitor the ambient noise at various points in the spectrum as a serial device hops through them. The Spectrum Tool is available for 900 MHz, 2.4 GHz, and 1.3 GHz serial devices only.
- **Setup Terminal** - Use this application to configure device using a terminal window. The Setup Terminal application mirrors the menu structure you would see if you were using HyperTerminal.
- **Modbus Interface** - Use this application to monitor and test register map values on any device that uses a Modbus interface.
- **CP Data Logger** - Use this application to review basic polling and reporting for FreeWave Cathodic Protection Remote Monitoring Units.
- **Updates** - Use this application to review the changes in the latest version of Tool Suite and to ensure that you are running the latest version.

This document covers how to use the Tool Suite and the applications within it including the following:



- Instructions to install Tool Suite and the components required to run it.
- Descriptions of the navigation features used across Tool Suite applications.

- Details about defining networks, which are used across the applications in Tool Suite.
- Instructions to use the features in each application available in the Application pane.

For information about configuration settings for each FreeWave device, see that device's user manual or addendum. For information about what is new in the latest versions of Tool Suite, click Updates in the Application pane within Tool Suite. The additions to each release are listed on the initial page.

## Notational Conventions

This guide uses the following notational conventions:

- **Bold** - Indicates items that you select, parameter settings, and parameter names.
-  **Warning!** - Indicates a situation that might cause damage to your radio, data, or network.
-  - Provides time saving or informative suggestions about using the product.

## Contacting FreeWaveTechnical Support

For up-to-date troubleshooting information, check the Support page at [www.freewave.com](http://www.freewave.com).

FreeWave provides technical support Monday through Friday, 7:30 AM to 5:30 PM Mountain Time (GMT -7). Call toll-free at 1.866.923.6168, within Colorado call 303.381.9200, or contact us through email at [moreinfo@freewave.com](mailto:moreinfo@freewave.com).

## Documentation Feedback

Your feedback is important to us! FreeWave Technologies, Inc. is committed to continually improving the quality of our documentation. If you have any comments or suggestions about this document, send them to us at [techpubs@freewave.com](mailto:techpubs@freewave.com). Please include the title of the document or the document's part number in your email.

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# Chapter 1: Introduction to Tool Suite

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Tool Suite consists of applications that you can use to configure devices and run diagnostics to determine how well the devices in your network are performing. Each application is described in detail in its own chapter in this document.

This chapter discusses the following:

- Installing and updating Tool Suite.
- Using the navigation components that are common throughout the applications available within Tool Suite.
- Connecting to a device from within Tool Suite.

As you work in Tool Suite, the changes you make are saved automatically. However, if you are making changes to radio settings, the changes are not made on the device until you choose to send them to the device. For more information, see "Programming Devices" on page 28.

## Installing and Upgrading Tool Suite Software

Tool Suite is compatible with the following operating systems:

- Windows 2003 Service Pack 1
- Windows XP Service Pack 2
- Windows Vista
- Windows 7 or higher

Before installing the Tool Suite software, ensure that your computer has the following required components:

- Microsoft SQL Server CE Service Pack 2
- Microsoft .NET framework version 3.5

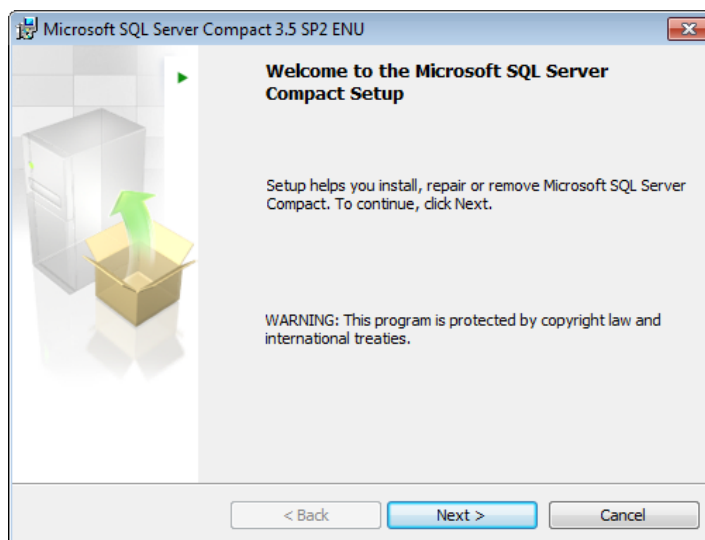
Both components are available from the FreeWave customer support site at [www.freewave.com](http://www.freewave.com) and are included in the Tool Suite install available on the FreeWave *User Manual and System Tools* CD. If .NET, Microsoft SQL Server, and Microsoft Report Viewer 2008 are not detected when initializing the Tool Suite installation setup from the CD, these programs are downloaded and installed automatically and require an Internet connection during the installation. This process may take several minutes for each to program install.

**Note:** To gain access to the FreeWave customer support Web site, create your own login using the onscreen instructions on the Web page.

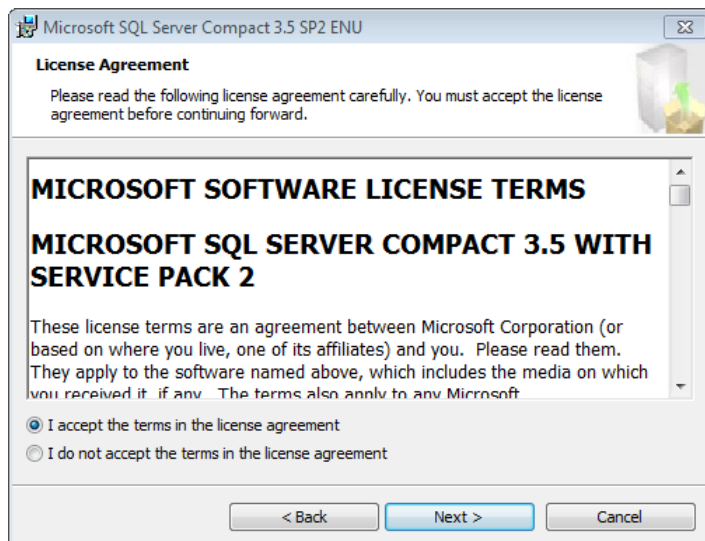
## Installing Microsoft SQL Server

You must have Microsoft SQL Server CE Service Pack (SP) 2 installed on the computer on which you want to install Tool Suite. The installation file is available for download from the customer support site at [www.freewave.com](http://www.freewave.com) or from the FreeWave *User Manual and System Tools* CD.

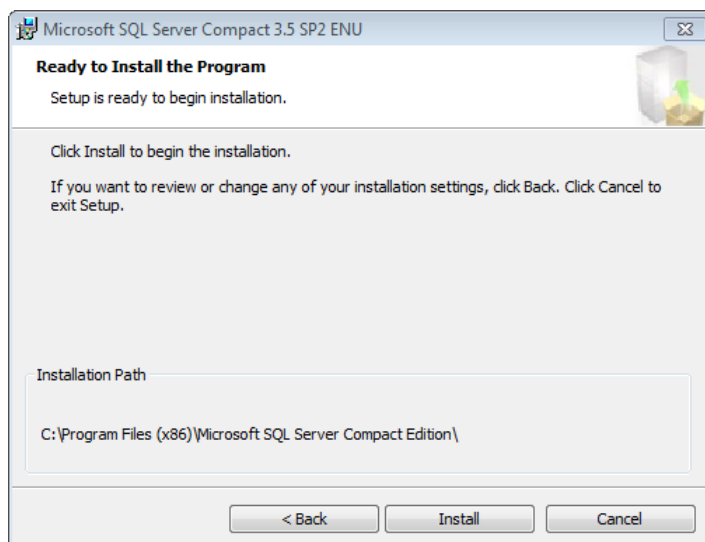
1. Do one of the following to launch the installer:
  - If you need to install Microsoft SQL Server CE SP 2, Microsoft .NET, and the Tool Suite application, login to the FreeWave customer Web site, select **Software**, and double-click the **FreeWave Tool Suite Web Install** link to launch the installer.
  - If you need to install only Microsoft SQL Server CE SP 2, login to the FreeWave customer Web site, select **Software**, and double-click the **Microsoft SQL Server SP 2 Link** to launch the installer.
  - If you are using the *User Manual and System Tools CD*, insert the CD-ROM into the CD drive on your computer. If AutoPlay is enabled, the CD contents automatically launches. Otherwise, double-click **FW Utilities CD** in Windows Explorer. In the main menu click **Software**. Click **Install Tool Suite** to launch the installer.
2. Click **Next** to begin the Microsoft SQL Server Compact setup and installation.



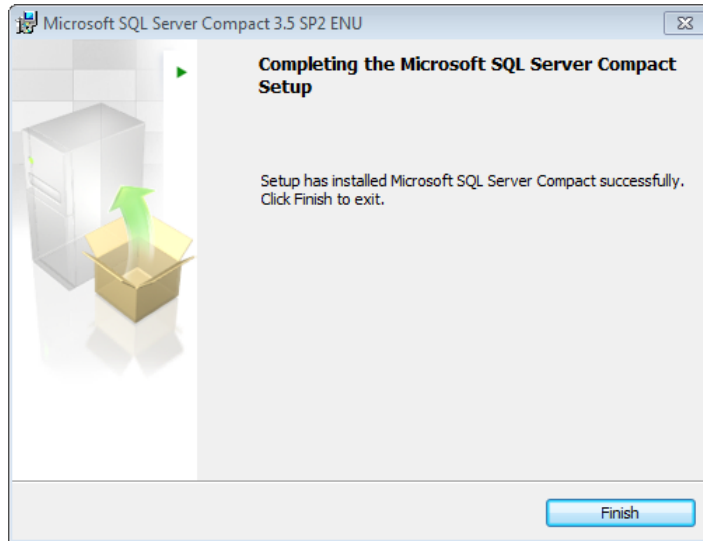
3. Read the license agreement and select **I accept the terms of the license agreement** if you agree with the terms. Click **Next** continue with the installation or click **Cancel** to exit.



4. After the setup is complete, click **Install** to begin the installation.



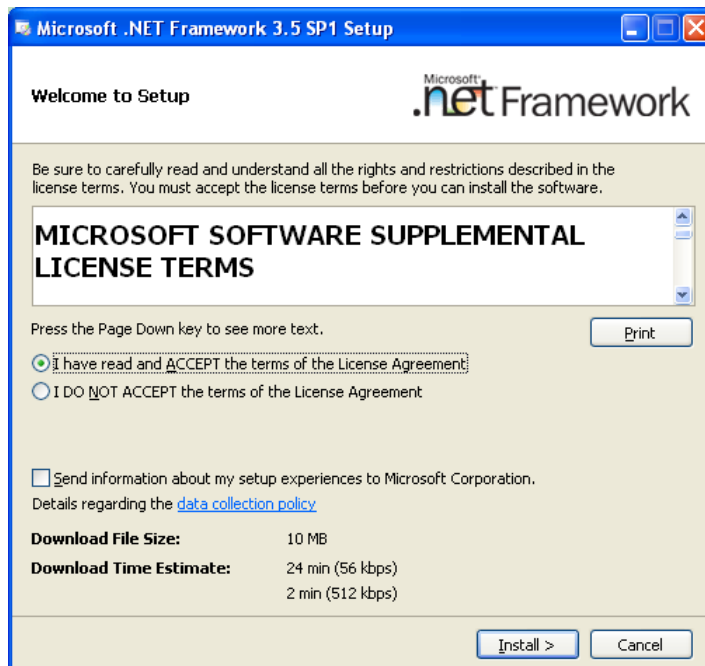
5. After the installation is complete, click **Finish** to exit and continue with installing the Microsoft .NET framework.



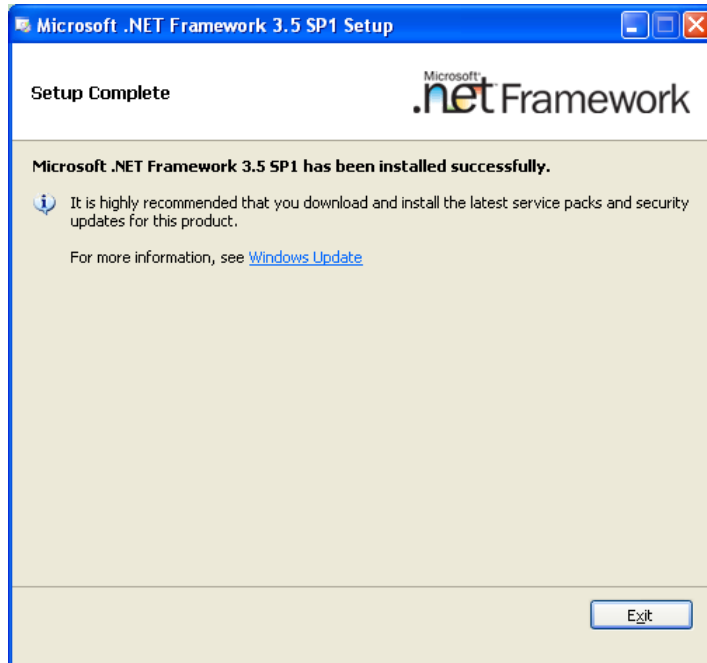
## Installing the Microsoft .NET Framework

If you are running the Tool Suite Web install or are installing Tool Suite from the *User Manuals and System Utilities* CD, the Microsoft .NET Framework installation starts after you install Microsoft SQL Server.

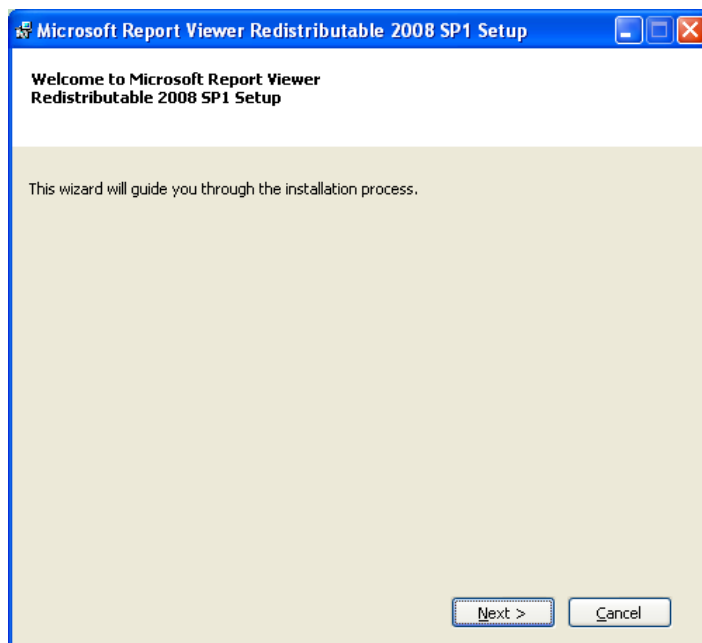
1. Login to the FreeWave customer Web site, select **Software**.
2. Double-click the Microsoft .NET Framework link to launch the installer.
3. Read the license agreement and select **I accept the terms of the license agreement** if you agree with the terms. Click **Install** to continue with the installation or click **Cancel** to exit.



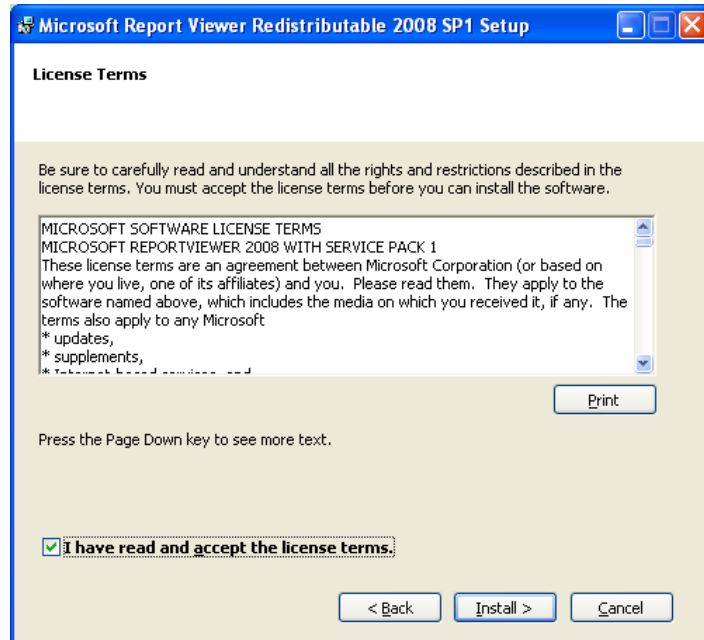
4. After the installation is complete, click **Exit** to exit and continue with installing Microsoft Report Viewer.



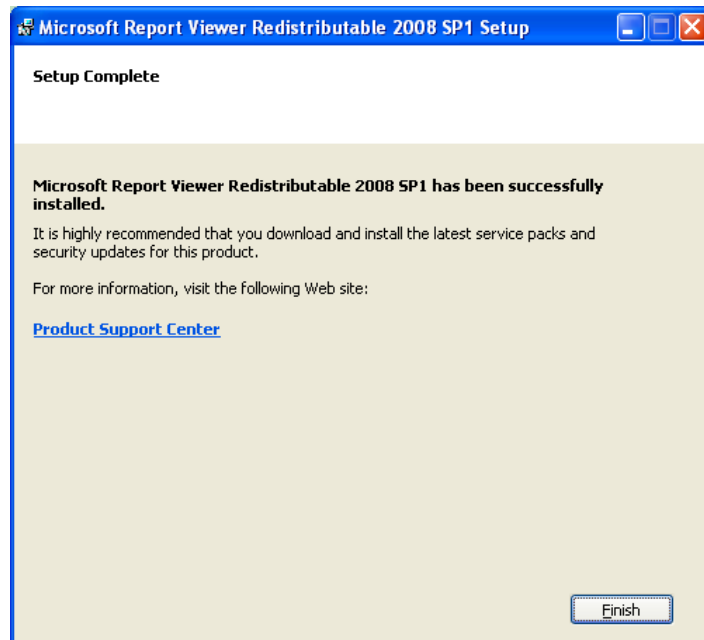
5. Click **Next** to continue with the installation or **Cancel** to exit.



6. Read the license agreement and click **I have read and accept the license terms** if you agree with the terms. Click **Install** to continue with the installation or click **Cancel** to exit.



7. After the installation is complete, click **Finish** to exit and continue with the Tool Suite installation.





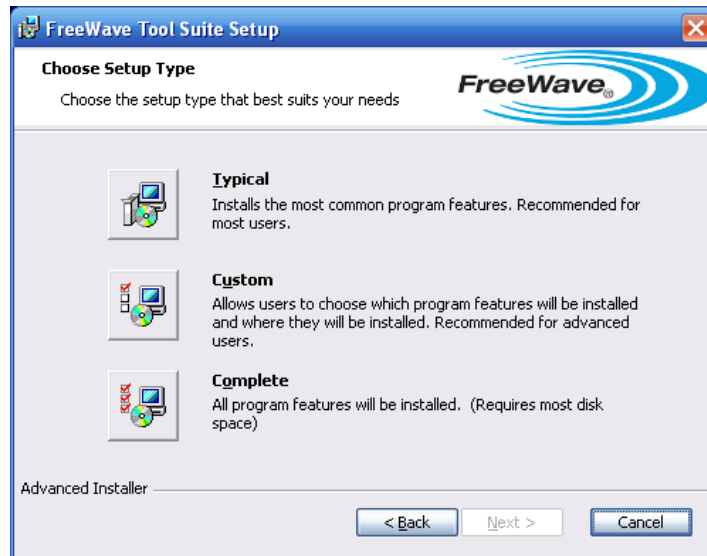
## Installing the Tool Suite Application

After the required components are installed on your computer, you can install the Tool Suite application. The installation adds a shortcut icon to your desktop.

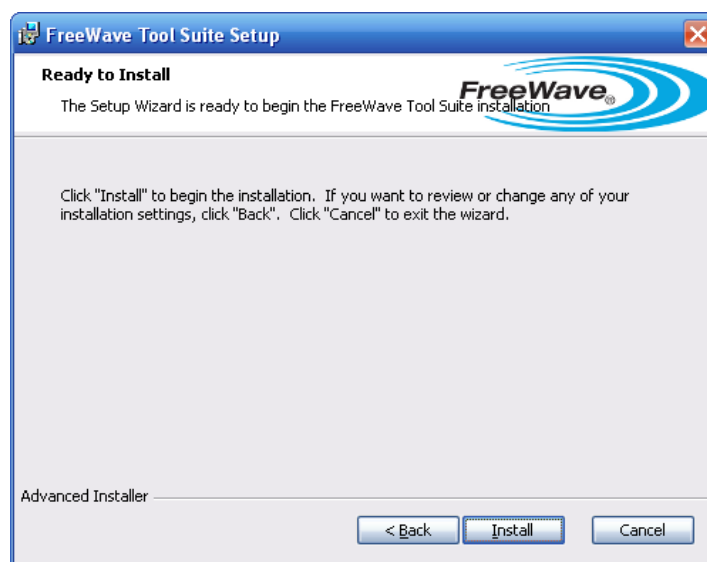
1. Do one of the following to launch the Tool Suite installer:
  - Login to the FreeWave customer Web site, select **Software**, and double-click the **FreeWave Tool Suite CD Install** link to launch the installer.  
If you need to install both Microsoft SQL Server CE SP 2 and Microsoft .NET Framework, double-click the **FreeWave Tool Suite Web Install** link.
  - If you are using the *User Manual and System Tools CD*, insert the CD-ROM into the CD drive on your computer. If AutoPlay is enabled, the CD contents automatically launches. Otherwise, double-click **FW Utilities CD** in Windows Explorer . In the main menu click **Software**. Click **Install Tool Suite** to launch the installer.
2. In the Welcome to FreeWave Tool Suite Setup Wizard window, click **Next** to continue with the installation.



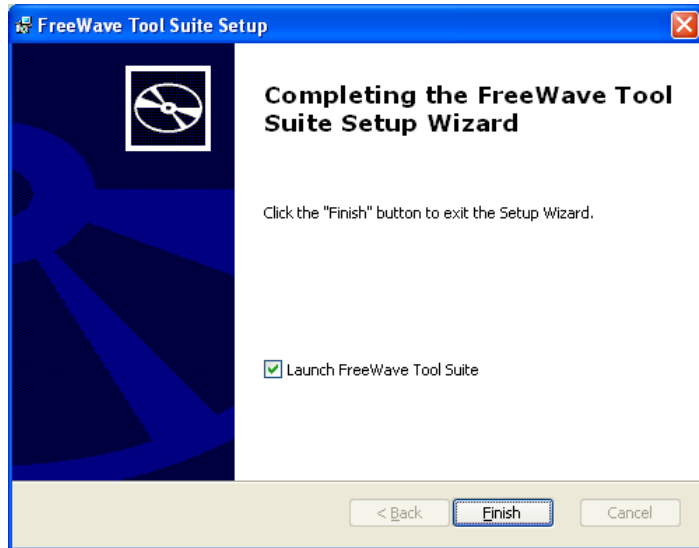
3. Select the setup you want to run and click **Next**.  
If this is the first time you are installing Tool Suite on your computer, select **Complete**.



4. Click **Install** to proceed with the installation or click **Back** to change the Setup Type or **Cancel** to exit.



5. After the installation is complete, click **Finish** to exit and launch FreeWave Tool Suite.



## Data Backups

As you work in Tool Suite, the items you create, such as networks and radio templates, are saved in the ToolSuite.sdf file. In version 2.8.5, you can create a backup copy of this file and save it to any location on your computer or network. Backing up your data ensures that you always have a copy of your network and device settings in the event of a computer malfunction.

Tool Suite prompts you to create a data backup seven days after the last backup was completed.

After you have upgraded to version 2.8.5, any future upgrades make an automatic backup copy of your ToolSuite.sdf (all Configuration application data), ModPoller.sdf (all Modbus Interface data), and cprmu.sdf (all CP Data Logger data) files in the the C:\Program Files\FreeWave Technologies\Freewave Suite\backups directory.

### To back up your Tool Suite data manually:

1. From the **File** menu, select **Back Up Data** to display the Select Backup File dialog box.
2. Navigate to the directory where you want to save the backup file.

By default, the system displays the C:\Program Files\FreeWave Technologies\Freewave Suite\backups directory and the file name is ToolSuite.sdf<date and time stamp>.bak. FreeWave recommends accepting the default file name.

3. Click **Save** to save the file.

**Note:** You cannot manually back up data from the Modbus Interface or CP Data Logger applications within Tool Suite at this time.

### To restore Tool Suite data from a backup copy:

**Note:** Restoring data from a backup copy completely replaces the current Tool Suite data with the data in the backup file. FreeWave recommends saving a backup copy of the current Tool Suite data prior to restoring from a backup.

1. In Windows Explorer, go to C:\Program Files\FreeWave Technologies\Freewave Suite\backups and locate the **ToolSuite.sdf<date and time stamp>.bak** file with the date and time stamp from

which you want to restore data. This may not be the file with the latest date and time stamp.

If you have backed up data manually to another location, go to that location to locate the file.

2. Rename the file to **ToolSuite.sdf**
3. Copy the renamed file to the C:\Program Files\FreeWave Technologies\Freewave Suite\data directory.
4. Open Tool Suite.

Your data from the copied file is read into the application.

To restore ModBus Poller or CP Data Logger data, locate the **ModPoller.sdf.bak** or the **cprmu.sdf.bak** file from the C:\Program Files\FreeWave Technologies\Freewave Suite\backups, delete the .bak extension from the file name, and copy the file into the C:\Program Files\FreeWave Technologies\Freewave Suite\data directory.

## Tool Suite Navigation

The buttons, ribbons, and toolbars in Tool Suite help you to navigate to different portions of the application. In addition, options are available using the right-click and left-click buttons on your computer mouse. The following sections describe the navigation tools available in the application and when to use each.

### Recommended Computer Display Settings

When running Tool Suite, to achieve optimal visual performance set the computer's desktop display settings to the following recommended settings. Depending on your system setup, Administrative rights to the computer may be required to make these changes.

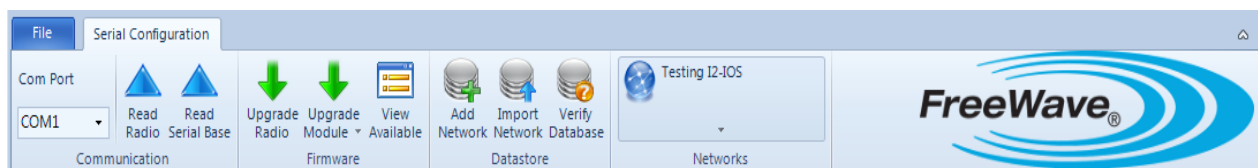
- **Minimum resolution** - 1024 x 768
- **DPI** - 96.

A DPI setting of 120 is not supported (graphics may not align and some text may be partially hidden).

### Ribbons and Toolbars

Ribbons refer to the toolbars that have either the FreeWave logo on them or the title bars underneath that display the network name. The sections used to group buttons with like functionality together on these ribbons are specific to the application you have open within Tool Suite.

**Note:** The terms “ribbon” and “toolbar” are used interchangeably throughout this manual.



Below the main ribbon is a Network Title ribbon that displays the name of the network that is currently selected. This ribbon only displays in the Configuration, Network Diagnostics, and CP Data Logger applications and includes additional options that apply to those applications.

Network Title ribbon in the Configuration application:



Network Title ribbon in the Network Diagnostics application:



Network Title ribbon in the CP Data Logger application:



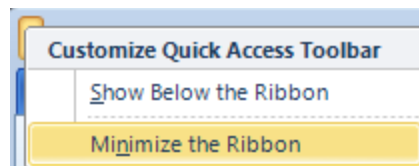
### Minimizing or Maximizing the Ribbon

You can minimize the ribbon at the top of the window to maximize the viewing space within the application. Minimizing the ribbon applies to the application you are currently viewing. When you switch applications, the ribbon maximizes for that application.

1. Click the arrow button above the **File** menu.

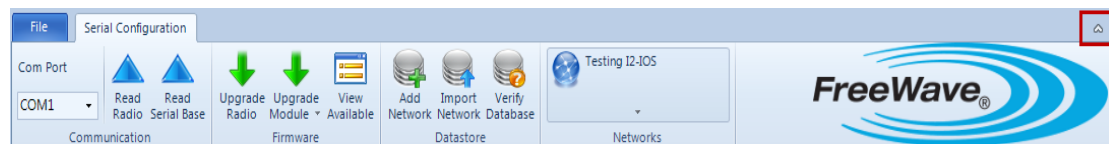
If you moved the Quick Access Button to below the ribbon, the arrow button might be located below the ribbon or the **File** menu.

2. Select **Minimize the Ribbon**.

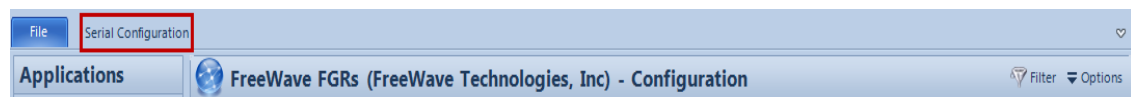


If the menu option displays with a check mark next to it, the ribbon is already minimized. Select the option to maximize the ribbon.

You can also minimize the ribbon using the ribbon toggle button located above the FreeWave logo.

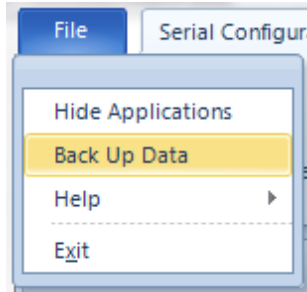


When the ribbon is minimized, the tab still displays. Click once on the tab to maximize the ribbon. The ribbon displays until you click anywhere outside the ribbon.



### File Drop-Down Menu

The **File** drop-down menu in the main ribbon functions similar to a File menu in most Windows software programs.

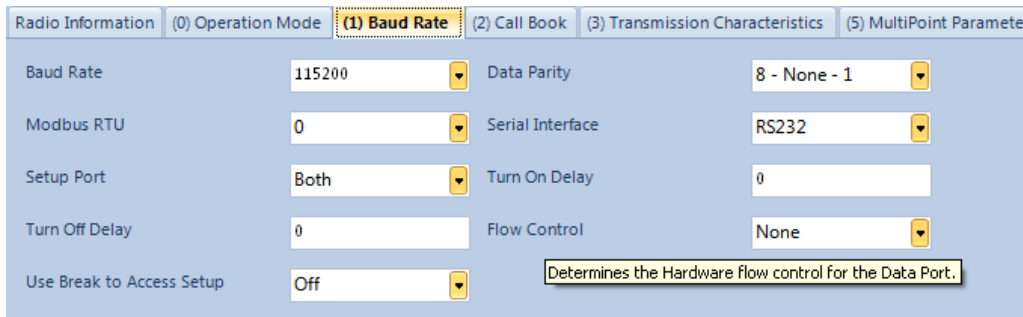


Access the following functionality from the **File** drop-down menu:

- **Hide Applications** - Shows or hides the Application pane that displays on the left side of Tool Suite.
- **Back Up Data** - Allows you to save a backup copy of the ToolSuite.sdf file, which contains all your Tool Suite data. For more information, see "Data Backups" on page 9.
- **Help > About** - Displays the Tool Suite software version information.
- **Help > User Manual** - Opens an Adobe PDF version of the latest Tool Suite user manual. Adobe Acrobat Reader is required to read this file. You can download Adobe Acrobat Reader for no charge at [www.adobe.com](http://www.adobe.com).
- **Exit** - Closes Tool Suite.

## Field Tool Tips

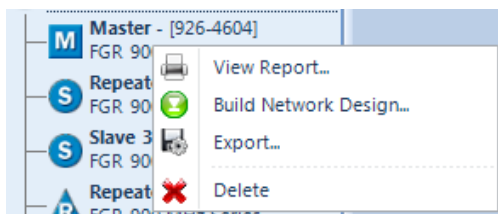
Hold the mouse cursor over a setting to display a brief description about that parameter's function .



**Note:** This feature does not apply to I/O Expansion menus.

## Accessing Individual Device Options

A device's options depends on its operation mode, for example Master or Slave. To access specific options for a device in places such as the Device tree in the Configuration application, right-click the device.



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## Chapter 2: Network Files and Settings

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The devices that you use exist in a network, that is, devices are connected to each other to communicate with one another. In Tool Suite, you can set up the devices that you program and monitor using networks that mirror the devices you have setup in your actual network. You can group devices into serial, TCP Terminal Server, and Ethernet networks. Networks can be setup by geographic region, by customer, or whatever grouping that helps you to identify the devices.

Each network has its own set of devices and configuration settings to connect to the devices within it.

The following applications within Tool Suite use networks:

- **Configuration** - Networks defined in this application are shared with the Network Diagnostics application. For more information, see "Creating Configuration and Network Diagnostics Networks" on page 13.
- **Network Diagnostics** - Networks defined in this application are shared with the Configuration application. For more information, see "Creating Configuration and Network Diagnostics Networks" on page 13.
- **CP Data Logger** - Typically you have only one CP network that you define the first time you use the CP Data Logger application. For more information, see "Configuring CP Data Logger Network Settings" on page 73.
- **Modbus Interface** - Typically you have only one Modbus Interface network that you define the first time you use the Modbus Interface application. For more information, see "Configuring Modbus Network Settings" on page 86.

### Creating Configuration and Network Diagnostics Networks

Setup a network prior to configuring serial or Ethernet devices in the Configuration application or running diagnostics in the Network Diagnostics application. Tool Suite supports multiple networks and network types that can run simultaneously.

**Note:** The TCP terminal server network is only useful in the Network Diagnostics application where you want to gather diagnostics of a serial network through a TCP/IP connection to a terminal server.

To create a network for use in the Modbus Interface application, see "Configuring Modbus Network Settings" on page 86.

To create a network to monitor in the CP Data Logger application, see "Configuring CP Data Logger Network Settings" on page 73.

**To create a serial network:**

1. In either the Configuration application or the Network Diagnostics application, click **Add** in the Datastore section of the ribbon to display the Add Network window.
2. In the **Network Name** field, enter a name that identifies the network's purpose.
3. *(Optional)* In the **Company** field, enter a company name associated with the network.
4. Click **Next**.
5. From the **Network Type** drop-down list, select **Serial**.
6. If you are creating a network in the Configuration application, click **Finish** to save the network to the database.  
  
If you are creating a network in the Network Diagnostics application, click **Next** and continue with the next step.
7. In the **Are you using 1.4 GHz** field, select **Yes** if there are any 1.4 GHz devices in your network. If there are not, leave the field set to **No**.
8. In the **Com Port** field, select the port to which the device is connected and click **Next**.
9. Click **Finish** to save the network to the database.
10. For additional network options, see "Configuring Network Settings" on page 19.

**To create a TCP Terminal Server network:**

1. In either the Configuration application or the Network Diagnostics application, click **Add** in the Datastore section of the ribbon to display the Add Network window.
2. In the **Network Name** field, enter a name that identifies the network's purpose.
3. *(Optional)* In the **Company** field, enter a company name associated with the network.
4. Click **Next**.
5. From the **Network Type** drop-down list, select **TCP Terminal Server**.
6. If you are creating a network in the Network Diagnostics application, click **Next** and continue with the next step.
7. In the **IP Address** field, enter the IP address of the terminal server used to read the network.
8. In the **Port** field, enter the port number on the terminal server used to read the network and click **Next**.
9. Click **Finish** to save the network to the database.
10. For additional network options, "Configuring Network Settings" on page 19.



**To create an Ethernet network:**

1. In either the Configuration application or the Network Diagnostics application, click **Add** in the Datastore section of the ribbon to display the Add Network window.
2. In the **Network Name** field, enter a name that properly identifies the networks purpose.
3. *(Optional)* In the **Company** field, enter a company name associated with the network.
4. Click **Next**.
5. From the **Network Type** drop-down list, select **Plus Ethernet**.
6. If you are creating a network in the Configuration application, click **Finish** to save the network to the database.  
  
If you are creating a network in the Network Diagnostics application, click **Next** and then click **Finish** to add the network to the database.
7. For additional network options, "Configuring Network Settings" on page 19.

## Importing Networks

If you have a FreeWave network file that was exported from Tool Suite, you can import the content of that network. You can import the following file types:

- **FreeWave Network File (.fwn)** - A file that was exported from Tool Suite versions 2.2 and above.
- **FreeWave Network Design (.fwt)** - A file that was exported from the Network Design tab.
- **FreeWave Data File (.sdf)** - A file that was exported from Tool Suite version 2.0.1.2 and before.
- **EzConfig File (.fws)** - A file that was exported from the FreeWave EZConfig application, which preceded Tool Suite.
- **Comm Control File (.nwf)** - A network design file that was exported from the FreeWave Comm Control application, which preceded EZConfig and Tool Suite.
- **Comma Separated Value (.csv)** - A comma separated values (.csv) file saved from a spreadsheet application such as Microsoft Excel. These files must be formatted Serial Number, Name, and if applicable, IP Address. If the file is not in this format, you receive an error when importing the file.

Ethernet networks only have the option to import Tool Suite .fwn and Comma Separated Value .csv file types.

1. In either the Configuration application or the Network Diagnostics application, click **Import** in the Datastore section of the ribbon to display the Add Network window.
2. From the **Options** drop-down menu in Network Title ribbon, select **Import** and select the file type to import.

You can also select **Import** from the Datastore section of the ribbon to import a Tool Suite version 2.2 and above file type (.fwn).

3. In the Import window, locate the file you want to import and click **Open** to import the file.  
  
Tool Suite processes the file and displays it.

You can now access the network from both the Configuration and Network Diagnostics applications.

## Exporting Networks

Use the Export functions to save a network data for transferring to a different Tool Suite instance, or for viewing in a spreadsheet or database.

**Note:** If you have multiple networks that you want to export, you must export each network individually.

You can export the data in a network in Tool Suite to one of the following:

- **FreeWave Network File (.fwn)** - In the Configuration application, exports the settings for the discovered and template devices in a network that you can import into another Tool Suite instance. You can also use this option if you want to make a copy of a network file and then import it to use as a base for a different network.

In the Network Diagnostics application, exports the network file, the historical diagnostic data, and the Path View into the network.

Using an exported network configuration file, you can:

- Load an existing radio configuration when you add radios to an existing network.
- Reload the configuration of any radio in the network when replacing a failed or damaged radio.
- Send your exact network configuration to someone for review or troubleshooting.
- Ensure the network configuration is always available at the Master radio site. If you need to program a radio in the network, you have the needed configuration files at hand.
- Ensure you always have a saved version of the latest configuration settings for your network.
- **Network Settings Report (.csv)** - In the Configuration application, exports the settings for the discovered devices in your network to a file that you can open in a spreadsheet application such as Microsoft Excel.

In the Network Diagnostics application, exports the network file, the historical diagnostic data, and the Path View information to a file that you can open in a spreadsheet application such as Microsoft Excel.

Viewing your network data in a spreadsheet can offer better clarity about settings across the network.

- **FreeWave Network Design (.fwt)** - Exports the virtual network map in the Network Design tab of the Configuration application that you can import into another Tool Suite instance. You can also use this option if you want to make a copy of a Network Design and then import it to use as a base for a different network.

You can export a Network Design file from the Configuration application.

- **SQL Server Database** - Exports network data to the SQL Server database of your choice. You must have Read/Write permission to the server, and the server must be accessible to Tool Suite.

You can export a network to a SQL Server database from the Configuration, Network Diagnostics, and CP Data Logger applications.

**To export a FreeWave Network:**

1. In either the Configuration application or the Network Diagnostics application, select the network you want to export from the Networks section of the ribbon.
2. From the **Options** drop-down menu in the Network Title ribbon, select **Export > FreeWave Network File**.

You can also right-click in an empty area in the tree view and select **Export > FreeWave Network File**.

3. If you are exporting a network file from the Network Diagnostics application, enter the date range for which you want to include historical diagnostic data in the export and click **Export**.

For example, if you want to see historical data for the last month, enter the first and last days of that month in the corresponding fields.

To complete the export without any historical diagnostic data, select the Exclude Diagnostic History check box and click **Export**.

4. In the Export Network window, select the directory location to where you want to save the file.
5. In the **File name** field, enter the file name and click **Save**.

The file is saved in the directory location with a .fwn extension.

**To export a Network Settings Report:**

1. In either the Configuration application or the Network Diagnostics application, select the network you want to export from the Networks section of the ribbon.
2. From the **Options** drop-down menu in the Network Title ribbon, select **Export > Network Settings Report**.

You can also right-click in an empty area in the tree view and select **Export > Network Settings Report**.

3. In the Export Network window, select the directory location to where you want to save the file.
4. In the **File name** field, enter the file name and click **Save**.

The file is saved in the directory location with a .csv extension and opens the default application you have set to open .csv files on your computer.

**To export a FreeWave Network Design:**

1. In the Configuration application, select the network you want to export from the Networks section of the ribbon.
2. From the **Options** drop-down menu in the Network Title ribbon, select **Export > FreeWave Network Design**.

You can also right-click in an empty area in Network Design and select **Export > Design**.

3. In the Export Network window, select the directory location to where you want to save the file.
4. In the **File name** field, enter the file name and click **Save**.

The file is saved in the directory location with a .fwt extension.

**To export a network to a SQL Server database:**

1. In either the Configuration application or the Network Diagnostics application, select the network you want to export from the Networks section of the ribbon.  
In the CP Data Logger application, there is only the network.
2. From the **Options** drop-down menu in the Network Title ribbon, select **Export > SQL Server DB**.  
You can also right-click in an empty area in the tree view and select **Export > SQL Server DB**.
3. In the Database Connection Form window, complete the following information about the SQL Server database to which you want to save the network data:

Field	Description
<b>Database Server</b>	Enter the location of the server that runs the SQL database to which you want to save the network data. This database must be within your IT network and the computer on which you are working must have access to the location.
<b>Database Name</b>	<i>(Read Only)</i> The network data is saved to a table in the SQL Server database called FreeWaveNetwork. If you are exporting from the CP Data Logger application, the network data is saved to a table called FreeWaveCPData.  If the the table already exists in your database, when you export, Tool Suite adds lines to the existing table.
<b>Use Windows Authentication</b>	Select this check box to use your Windows user name and password to access the SQL Server database. If your database access credentials are different from your Windows user name and password, leave this check box unselected and use the <b>Data User Name</b> and <b>Password</b> fields.
<b>Database User Name</b>	Enter the user name you use to access the server in the <b>Database Server</b> field.
<b>Password</b>	Enter the user password you use to access the server in the <b>Database Server</b> field.

4. Click **Test Connection** to ensure you have access to the database and that the user name and password you entered are correct..  
  
If Tool Suite can connect to the database, you receive a Success message. If Tool Suite cannot connect to the database you entered, you receive an error message. Verify that the information you entered in the Database Connection Form window is correct and that the server is running and test the connection again.
5. Click **OK** to export the network data to the SQL Server database.

**Deleting Devices From Networks**

You can remove the devices from a defined network without deleting the network and the network settings. You can also deletes all device and settings associated with a network, the network name, and any stored diagnostic data.

**To remove an individual device from a network:**

1. In either the Configuration application or the Network Diagnostics application, select the network you want to change from the Networks section of the ribbon.
2. Right-click in an empty area in the tree view and select **Delete**.

Click **Yes** at the prompt to delete the device from the network or click **No** to continue without clearing the device from the network.

**To remove all the devices from a network:**

1. In either the Configuration application or the Network Diagnostics application, select the network you want to change from the Networks section of the ribbon.
2. From the **Options** drop-down menu in the Network Title ribbon, select **Clear Network**.

You can also right-click in an empty area in the tree view and select **Clear Network**.

Click **Yes** at the prompt to remove all the devices from the network or click **No** to continue without clearing the devices network.

**To delete a network:**

1. In either the Configuration application or the Network Diagnostics application, select the network you want to delete from the Networks section of the ribbon.
2. From the **Options** drop-down menu in the Network title ribbon, select **Remove Network**.

You can also right-click in an empty area in the tree view and select **Remove Network**.

Click **Yes** at the prompt to remove the network and all its data from Tool Suite or click **No** to continue without deleting the network.

## Configuring Network Settings

*(For Configuration and Network Diagnostics Applications)*

Before you connect to devices in a network, define the network's settings. The network settings provide Tool Suite with the information it needs to connect to the devices in the network.

Networks in the Modbus Interface and CP Data Logger applications also have network settings. For more information, see "Configuring Modbus Network Settings" on page 86 and "Configuring CP Data Logger Network Settings" on page 73.

1. In either the Configuration application or the Network Diagnostics application, select the network for which you want to configure settings from the Networks area in the ribbon.
2. From the Options drop-down menu in the Network Title ribbon, select **Network Settings** to display the Network Settings window.
3. Complete the following settings for the network:

Field	Description
<b>Name</b>	Enter an identifying name for the network. If this field is left blank, the network name is Default Network.

Field	Description
<b>Company</b>	<i>(Optional)</i> Enter the company name associated with the network.
<b>Interface</b>	Enter the network type (serial or TCP). If you are setting a serial or TCP network also set the COM port, or whether 1.4 GHz radios are in use in the Network. Make the necessary changes and click Update in the Change Interface window before returning to the Network Settings window.
<b>Polling Interval (ms)</b>	<p>Enter the amount of time Tool Suite waits between each time it polls the radios. The default Polling Interval for Serial and TCP/IP networks is <b>200 ms</b> and to <b>500 ms</b> for Ethernet networks. See the section below for recommended polling intervals based on whether serial Repeaters are used in a network.</p> <p>To poll automatically when a polling interval has completed, select the <b>Auto</b> check box.</p>
<b>Polling Mode</b>	<p>Select from one of the following polling modes:</p> <ul style="list-style-type: none"> <li>• <b>Discovery</b> - During the first diagnostic run of a new network, to discover radios more quickly, set the polling mode to <b>Discovery</b> to allot 9 out of 10 polls to discovering new radios in the network, and 1 out of 10 polls to populating settings information.</li> </ul> <p>This is the default mode when a new network is added. <b>Discovery</b> mode is not available for Ethernet networks.</p> <ul style="list-style-type: none"> <li>• <b>Sequential</b> - After all radios have been discovered in the network, change to <b>Sequential</b> mode. This mode allots 1 out of 10 polls to discovering new radios, and 9 out of 10 polls to populating settings information.</li> </ul>
<b>Clear Diagnostics After</b>	<p>Select the amount of time Tool Suite waits before clearing data for the specified network.</p> <p>To keep the history data intact, select the <b>Exclude History</b> check box.</p>
<b>Notes</b>	Enter any additional information about the network that is not highlighted in the settings.

- Click **Update** to change the network settings or click **Cancel** to exit without updating the settings.

### Recommended Polling Intervals

The default **Polling Interval** field setting is 200 ms for serial and TCP/IP networks, and 500 ms for Ethernet networks. The table below provides recommended polling intervals based on whether your network includes serial Repeaters.

Network Type	Default Polling Interval	Minimum Polling Interval	Repeaters turned OFF in Master	1 Repeater (add 50 ms)	2 Repeaters (add another 50 ms)	For each additional Repeater, continue to add 50 ms
Serial	200 ms	100 ms	100 ms	150 ms	200 ms	250 ms
TCP/IP	200 ms	100 ms	100 ms	150 ms	200 ms	250 ms
Ethernet*	500 ms	100 ms	100 ms	150 ms	200 ms	250 ms
455 MHz	200 ms	300 ms	300 ms	600 ms	600 ms	Not supported

\* In Ethernet networks, customer data is not given polling priority over diagnostic data.

## Viewing Networks

You can view a single network at a time. When you open a network to view in one application, that network is also displayed in the other applications that use networks. For example, if you open Network A in the Configuration application, if you move to the Network Diagnostics application, Network A is open and displays in that application as well.

### To select a network to view:

1. In either the Configuration application or the Network Diagnostics application, click the drop-down list in the Networks section in the ribbon.
2. Select the network you want to view.

Networks are grouped into **Serial** and **Plus** (Ethernet) groups.

The selected network displays in the application.

## Connecting Radios to a Computer

To read and program a radio using Tool Suite, you need to connect the radio to a desktop computer or a laptop that runs the Tool Suite software.

1. Connect a serial or diagnostic cable between the computer or laptop and the radio. Using a diagnostic cable is recommended.
2. Connect the power supply and turn on the radio.

**Note:** You can use a serial cable for both Configuration and Setup Terminal applications; however, a Diagnostics cable is required to run diagnostics using the Network or Local Diagnostics applications. Also, for Diagnostics *only*, functionality is available via TCP/IP if routing through a Terminal server to reach the serial master radio.





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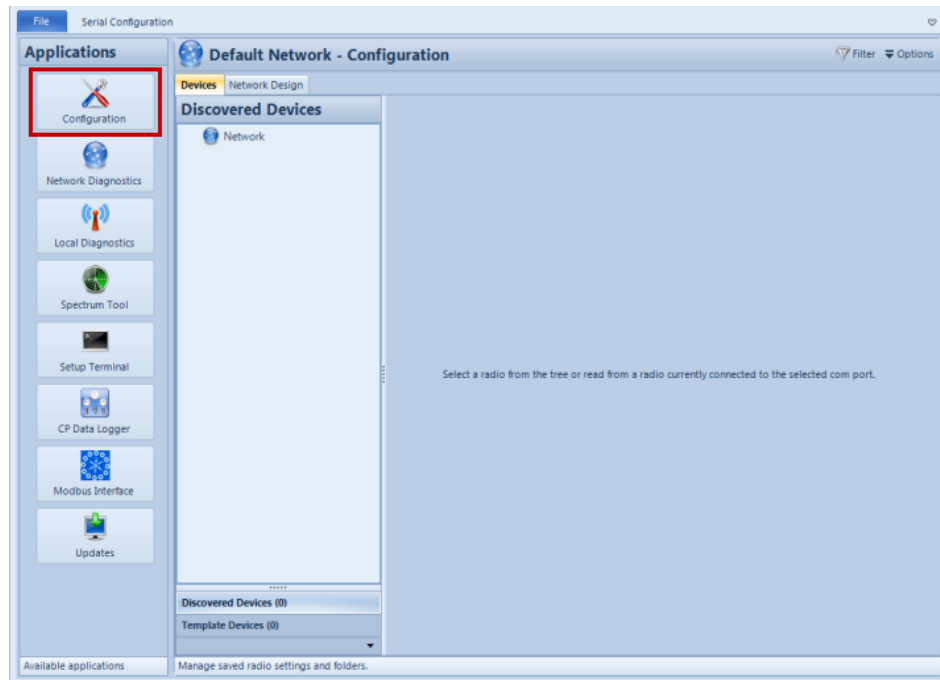
## Chapter 3: Configuration Application

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Use the Configuration application to program parameters on devices in your network. From the Configuration application you can do the following:

- Define templates that contain the settings to send to a device.
- Create Network Design diagrams that are a virtual version of your device network.
- Program device settings including resetting a device to its factory default settings.
- Upgrade to the latest version of firmware available for a device.

Click **Configuration** in the Applications pane to get started.



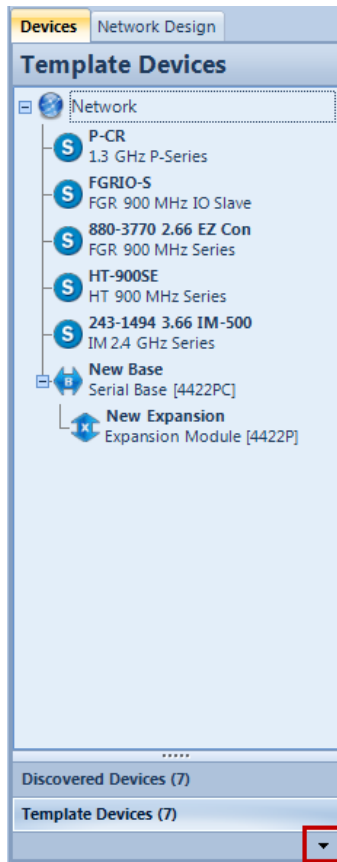
### About the Devices Tree

Tool Suite maintains a database of all radios that are read, programmed, or in some way manipulated in the software. This database allows you to check settings for a defined device without being connected to the device. You can view the devices stored for a selected network in the Devices tab. The devices in the network display in a tree format, similar to files and folders in directories display in Windows Explorer.





In the Devices tab, devices are grouped into one of the following views:

- **Discovered Devices** - Lists devices that have a serial number and are found when the device is read through the Network Diagnostics application or programming devices in the Configuration application.
- **Template Devices** - Lists any radio created manually through the template wizard and EZConfig imported files.

To change between the two views, click the corresponding accordion button at the bottom of the pane. To hide or show the accordion buttons, click the arrow at the bottom of the window pane and select which buttons to hide or show.



After Tool Suite successfully reads a device (after you click **Read Radio** or **Read Serial Base**), the list updates to include the read device's serial number, name, and a symbol to indicate the operation mode.

-  - Indicates a Master in the network.
-  - Indicates a Slave in the network.
-  - Indicates a Repeater in the network.
-  - Indicates a Serial Base in the network.

Tool Suite also refreshes the right side of the window to display the selected device's settings. Selecting a device listed in the Discovered Devices or Templates view refreshes the Device Information and other settings for that selection.

## Adding Template Devices to the Network

Use templates to define a device in your network. You can define the settings for the template, and use that template to program all the radios in your network with that configuration. Templates save you from having to define each individual device in your network if the devices share the same settings, and helps to ensure that devices that require the same settings across your network are programmed with the same settings.

You can add a template for a device to the Device tree which adds it to the network database for any network type. The device is added with the factory default settings. This feature functions as a single radio template and is added to the Template Devices view in the Device tree.

### To add a radio template to the Device tree:

1. Click **Configuration** in the Applications pane to display the Configuration application.
2. In the Networks section of the Configuration ribbon, select the network to which you want to add a device.
3. Right-click in a blank area of the Device tree and select **Add > Radio Template**.
4. In the **Name** field, provide a name that helps identify this device.
5. From the **Radio Type** drop-down list, select the type of device you want to add to your network.  
The lists includes all the supported devices for the network type.
6. Click **Add** to add the device to the Device tree or **Cancel** to exit without adding the device.

### To add a serial base template to a serial network Device tree:

1. Click **Configuration** in the Applications pane to display the Configuration application.
2. In the Networks section of the Configuration ribbon, select the network to which you want to add a device.
3. Right-click in a blank area of the Device tree and select **Add > Serial Base Template**.
4. In the **Name** field, provide a name that helps identify the base.
5. From the **Module Type** drop-down list, select the type of serial base you want to add to your network.
6. Click **Add** to add the device to the Device tree or **Cancel** to exit without adding the device.

## Organizing Devices in Folders in the Device Tree

If your network contains a larger number of devices, you can use folders in the Device tree to help organize the devices in the network. For example, you might create folders to store like devices together, or you might choose to organize the network by geographic region.

1. Click **Configuration** in the Applications pane to display the Configuration application.
2. In the Networks section of the Configuration ribbon, select the network to which you want to add a folder to the Device tree.
3. Right-click in a blank area of the Device tree and select **Add > Folder**.  
A new folder is added to the tree.
3. Right-click the folder in the tree and select **Rename** and enter a name that describes the content of the devices in the folder.
4. To move the folder in the tree, select the folder and drag and drop it to the correct location in the tree.
5. To move devices in to the folder, select the device and drag and drop it onto the folder.

## Filtering Devices in the Device Tree

If you have a large network and only want to see devices in the tree of a certain modem mode you can filter the contents of the tree to display only those devices. For example, if you only want to see the Master devices.

You can also filter devices in the Network Design view.

1. Click **Configuration** in the Applications pane to display the Configuration application.
2. In the Networks section of the Configuration ribbon, select the correct network.
3. From the **Filter** menu in the Network Title ribbon, select the device type to display.

To display all the devices, select **Show All**.

## Reading Current Settings From a Device

You can poll a device for its current parameter settings. Upon a successful read of a device, the Device tree updates to include the device's serial number, name, and a symbol to indicate the operation mode. Tool Suite also refreshes the right side of the window displaying the device settings. Selecting a device listed in the Discovered Devices or Templates view refreshes the Device Information and other settings for that device.

If an older version of firmware is loaded that Tool Suite does not support, the software prompts you to launch EZConfig to read the device's settings.

1. Connect the device to your computer using either the serial port or the diagnostics port and open Tool Suite
2. Click **Configuration** in the Applications pane to display the Configuration application.
3. In the Networks section of the Configuration ribbon, select the network to which you want to add a device.
4. If the device is serial, ensure the correct Com port is selected in the **Com Port** field. To find the correct port for the computer on which you are working, look in the Windows Control panel under **System > Hardware > Device Manager > Ports**.

Tool Suite pulls its Com port settings from the Windows operating system when you open Tool Suite. If you configured the Com port after opening Tool Suite, or connected a device to Tool Suite after opening Tool Suite, you might need to close the application and reopen it to select the correct Com port.

**Note:** If a Com port is not configured in Windows, it is not available in Tool Suite.

If the device is an Ethernet device, ensure the correct IP address for the device is entered in the **IP Address** field.

5. Click **Read Radio** to import settings from the device that is currently connected, or click **Read Serial Base** if you are reading the settings from a Serial Base device.

If you are reading an Ethernet device, you are prompted to enter the device's password if the password has changed since the last time you read the device from your current instance of Tool Suite.

If you are reading a Serial Base with Expansion Modules in a stack, Tool Suite reads the Serial Base plus all Expansion Modules connected in the stack (a stack consists of one I/O Expansion Serial Base or serial device, for example, FGR2-IO-IOE, and up to 15 Expansion Modules such as IOEX-4422).

**Note:** If you read a serial device's settings using the diagnostics cable, the device is placed into Setup mode automatically and all three LEDs on the device turn solid green. If you are reading a serial device's setting using the serial port, Tool Suite prompts you to place the device into Setup mode.

## Programming Devices

As you define the changes for a device in your network in the Configuration application, you can send the changes to the device when it is connected to the computer running Tool Suite. You can also return the device to its factory default settings.

**Note:** It is not currently possible to read a serial radio in the Configuration application connected locally to the computer running Tool Suite. The TCP terminal server network is only useful for network diagnostics where you want to gather diagnostics of a serial network through a TCP/IP connection to a terminal server.

Programming options are located above the tabs in the main Configuration application window, and display when Tool Suite is reading a device.



1. Click **Configuration** in the Applications pane to display the Configuration application.
2. In the Networks section of the Configuration ribbon, select the network that contains the devices you want to program.
3. Connect to the device and click **Read Radio** to poll the device for its settings.
4. Make changes to the settings, as necessary.
5. Select one of the following programming options in the Network Title ribbon to send the settings to the device:

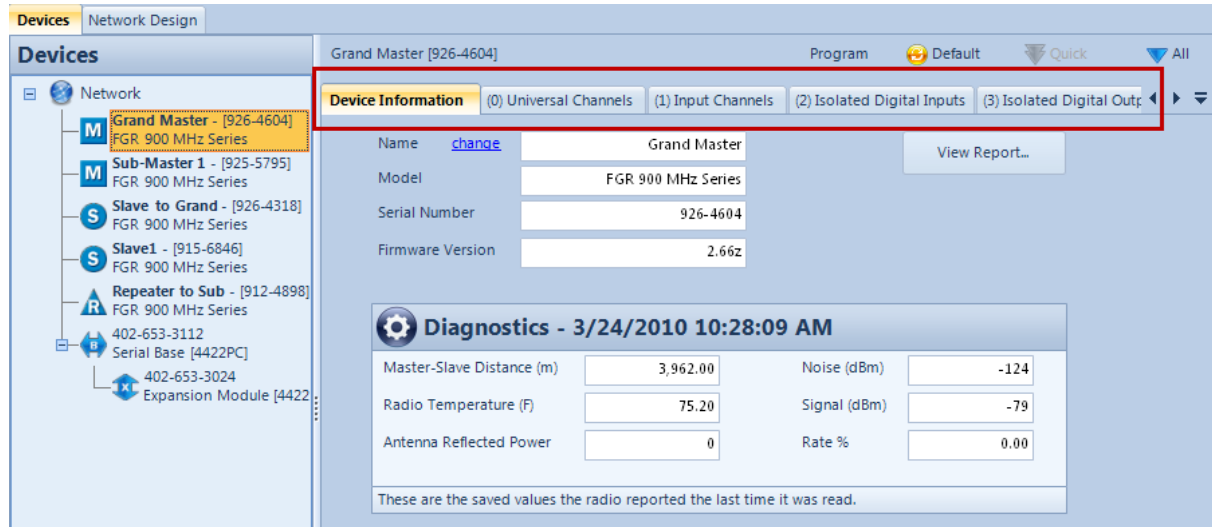
Programming Options	Description
<b>All</b>	Sends all the settings to the device, even if you have not made changes to a setting.  If you are programming an Ethernet device, you can send the settings to another device in the network. Enter that device's IP address when prompted.
<b>Quick</b>	Sends only the settings that you have changed.  <b>Note:</b> The Quick programming option is only available for changes made in the current session. If you close Tool Suite or select a different device, the Quick option is no longer applicable.
<b>Default</b>	Sends the factory default settings for all parameters to the device. Answer <b>Yes</b> at the prompt to set the radio back to its factory default settings.

When the device is programmed, the device's Carrier Detect (CD) LED displays solid green and the Clear to Send (CTS) LED displays solid red.

## About Device Parameter Settings

The network type that you are viewing, serial or Ethernet, determines the device templates that you can add to the network. Each set of devices has a set of parameters that you can configure and then send to the device. The parameters are grouped together in tabs that display in the Configuration application's main pane.

**Note:** The template parameter settings in a serial or TCP network are identical.



Each device can contain a different set of tabs and parameters, however, most devices in a serial network contain the same parameter settings and most devices in an Ethernet network contain the same parameter settings.

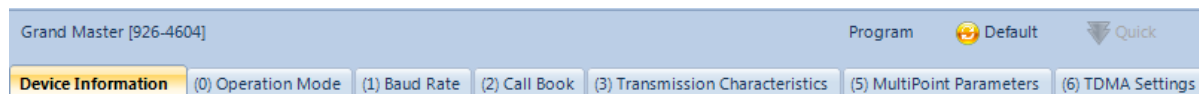
**Note:** The tabs names correspond to the menus as they appear in Setup Terminal and HyperTerminal.

The following sections provide a brief overview of the contents of each tab in the different network types. For details about how the parameters apply to the device you are setting and recommended values for each, refer to the documentation for the device you are configuring.

**Note:** Parameters that display with a double asterisk (\*\*) are parameters that must be the same for all devices across your network.

### Serial/TCP Terminal Network Device Parameter Tabs

The parameters for most devices available in a serial and TCP terminal devices include the following:

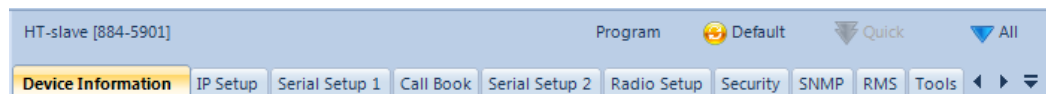


The following table provides an overview of the contents of each tab. For details about how the parameters apply to the device you are setting and recommended values for each, refer to the documentation for the device you are configuring.

Tab	Description
Device Information	Includes basic device identification information such as the device name, model number, and serial number. Common diagnostics information is also available on this tab if you are reading a device.
(0) Operation Mode	Operation Mode defines the device function (Master, Repeater, Slave, etc). FreeWave transceivers operate in a Master to Slave configuration. For transceivers to operate together, proper communication setup is required. Serial Ethernet options are also configured in this tab.
(1) Baud Rate	Includes communication settings between the transceiver and the instrument to which it is connected.
(2) Call Book	Includes the call information to incorporate up to 10 FreeWave transceivers, designate 1 to 4 Repeaters for use with each transceiver, and designate which specific Slave the Master calls, by serial number. <b>Note:</b> The Call Book is required in Point-to-Point networks.
(3) Radio Transmission Characteristics	Includes parameters that change how a transceiver sends data, for example frequency keys and low power settings. Many of the parameters in this tab must be maintained across the network for proper functionality. <b>Note:</b> The options in this tab determine the RF characteristics of the network. Default settings are not recommended for the network critical settings. However, an understanding of the settings in this menu is recommended prior to changing any of the values.
(5) MultiPoint Parameters	Includes settings used to control how data is handled in situations requiring retries and the settings to control the behavior of a MultiPoint Slave or Repeater.  When installing MultiPoint networks it is important to do some initial planning. Unlike Point-to-Point networks, a Point-to-MultiPoint network requires several parameters to be set consistently on all transceivers in the network. This includes <b>RF Data Rate</b> , <b>Min and Max Packet Size</b> , and <b>Frequency Key</b> .
(6) TDMA Settings	Includes Time Divisible Multiple Access (TDMA) settings, which allow transceivers to complete various operations in specific time slots. This option is only used for peer-to-peer communications or when applications are very time specific.  For additional information about TDMA, contact FreeWave Technical Support.

## Ethernet Device Parameter Tabs

The parameters for Ethernet network devices include the following :



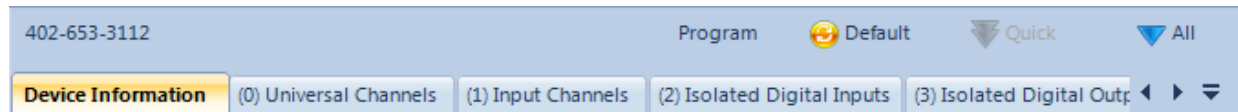


The following table provides an overview of the contents of each tab. For details about how the parameters apply to the device you are setting and recommended values for each, refer to the documentation for the device you are configuring.

Tab	Description
Device Information	Includes basic device identification information such as the device name, model number, and serial number. Common diagnostics information is also available on this tab if you are reading a device.
IP Setup	Contains communication information such as IP address and Default Gateway address for the device.  Check with your Network Administrator before altering any settings in this tab.
Serial Setup 1	Contains data settings for serial port 1 on the device. These settings need to match the serial device connected to this port. Serial ports 1 and 2 are independent of each other; they can have different baud rates, parity, protocol, and so on.
Call Book	Includes the call information to incorporate up to 10 FreeWave transceivers, designate 1 to 4 Repeaters for use with each transceiver, and designate which specific Endpoint the Gateway calls, by serial number.  <b>Note:</b> The Call Book is required in Point-to-Point networks.
Serial Setup 2	Contains the data settings for serial port 2 on the device. These settings need to match the serial device connected to this port. Serial ports 1 and 2 are independent of each other; they can have different baud rates, parity, protocol, and so on.
Radio Setup	Contains all the settings regarding general radio setup such as Operation Mode and transmission characteristics.
Security	Contains security settings such as RADIUS authentication, passwords, and encryption keys.  <b>Note:</b> MAC filtering is not currently supported in Tool Suite.
SNMP	Contains all SNMP management features, such as the SNMP version.  All of the SNMP manageable objects for the FreeWave Ethernet devices are contained in a single MIB file. FREEWAVE-TECHNOLOGIES-MIB. This file is available from FreeWave upon request.
RMS	Contains settings for enabling a Redundancy Master Station (RMS) and settings for the main and back up devices.
Users	Contains the group permissions to view and change settings.
Tools	Contains free-form fields where you can define a site information such as a site contact.

## I/O Serial Base and Expansion Module Device Parameter Tabs

The parameters for I/O Serial Bases and Expansion Modules include the following:



For details about how the parameters apply to the device you are setting and recommended values for each, refer to the documentation for the device you are configuring. The following table provides an overview of the contents of each tab.

Tab	Description
Device Information	Includes basic device identification information such as the device name, model number, and serial number.
(0) Universal Channels	Corresponds and programs channels 1, 2, 3, and 4 of the I/O Serial Base and Expansion Module devices.
(1) Input Channels	Corresponds and programs channels 5, 6, 7, and 8 of the I/O Serial Base and Expansion Module devices.
(2) Isolated Digital Inputs	Corresponds and programs channels 9 and 10 of the I/O Serial Base and Expansion Module devices.
(3) Isolated Digital Output	Corresponds and programs channels 11 and 12 of the I/O Serial Base and Expansion Module devices.
(4) Stack Settings	Applies to the I/O Serial Base and programs how the stack communicates with external Modbus devices.

## About Network Designs

Use the Network Design feature to design and configure a virtual network prior to programming devices. The Network Design gives you a visual representation of which devices are connected in your network. You can use the Network Design feature without previously adding devices to a network using the Devices tree.

Create network designs for a serial or an Ethernet network.

### Creating a Serial Network Design Using the Design Wizard

Using the Network Design wizard to define an Ethernet network creates a master template device from which the other devices in the network design are based. When you first enter the **Network Design** tab in a network, Tool Suite prompts you to add a Master using the Create Network Design Wizard.

**Note:** When creating Network Designs, the devices are applied to the current network that is selected. If you have not created or selected a unique network, the Network Design applies to the Default Network.

1. Click **Configuration** in the Applications pane to display the Configuration application.
2. From the Networks area in the Configuration ribbon, select the serial network you want to design.
3. Click the **Network Design** tab.

If the Create Network Design wizard does not display, right-click anywhere in the Network Design pane and select **Template Wizard**.

4. From the **Radio Type** drop-down list, select the Master radio type and click **Next**.
5. From the **Network Structure** drop-down list, select the network type and click **Next**.

**Note:** As of Tool Suite version 2.8.0, Point-to-Point and TDMA network structures are not yet supported in the Create Network Design wizard.

6. When prompted, set the following critical settings or accept the default settings and click **Next**.

For FreeWave radios to successfully communicate with one another within a network there are five critical settings that must be the same across all radios in the network. Slaves, Repeaters, or Slave/Repeaters connected to the Master template inherit these settings from the Master.

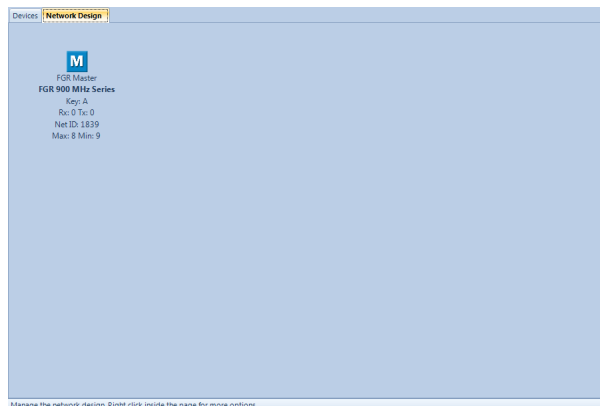
Setting	Description
<b>Frequency Key</b>	Select a value from 0 to 9 or letters A to E.
<b>Max Packet Size</b>	Select from numbers 0 through 9.
<b>Min Packet Size</b>	Select from numbers 0 through 9.
<b>RF Data Rate</b>	Select the RF data rate. Depending on the device, this could also be a selection of 1, 2, or 3.
<b>Network ID</b>	Select from 1 through 4095. 255 enables the Call Book.

7. Configure data port settings, which any connected Slave, Repeater, or Slave/Repeater inherits as well and click **Next**.

**Note:** For more information regarding settings, see the user manual for the radio.

8. In the **Template Name** field, enter a name that identifies the Master device and click **Finish** to save the template.

After the initial creation of the Master radio template is complete, a Master radio icon displays under the Network Design tab with the previously selected network parameters. To connect devices to the Master, see "Connecting Devices to Master Templates in Network Designs" on page 35.



## Creating an Ethernet Network Design Using the Design Wizard

Using the Create Network Design wizard to define an Ethernet network creates a master device from which the other devices in the network design are based. When you first enter the **Network Design** tab in a network, Tool Suite prompts you to add a Master using the Create Network Design Wizard.

**Note:** You must create a Plus Ethernet network before you can access the Network Design feature to create an Ethernet network.

1. Click **Configuration** in the Applications pane to display the Configuration application.
2. From the Networks area in the Configuration ribbon, select the Ethernet network you want to design.
3. Click the **Network Design** tab.

If the wizard does not display, right-click anywhere in the Network Design pane and select **Template Wizard**.

4. From the **Radio Type** drop-down list, select the Gateway radio type and click **Next**.
5. From the **Network Structure** drop-down list, select the network type and click **Next**.
6. When prompted, set the following critical settings or accept the default settings and click **Next**.

**Note:** As of Tool Suite version 2.4.0, Point-to-Point and TDMA network structures are not yet supported in the Network Design feature.

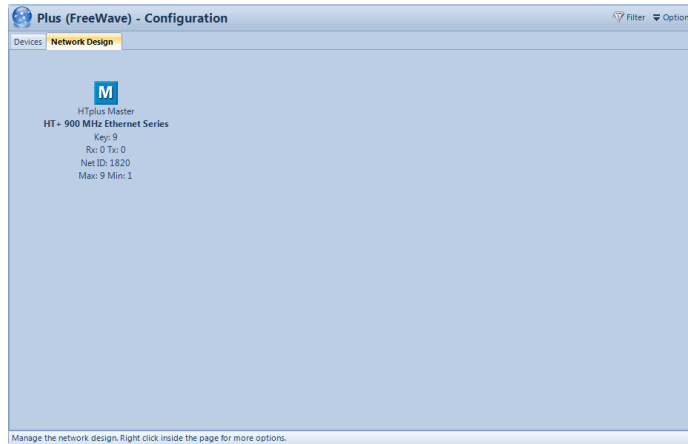
For FreeWave Ethernet radios to successfully communicate with one another within a network there are eight critical settings that must be the same across all radios in the network. Any Endpoint or Repeater connected to the Gateway template inherits these settings.

Setting	Description
<b>Subnet Mask</b>	Typically assigned by your network administrator.
<b>Default Gateway</b>	Typically assigned by your network administrator.
<b>Frequency Key</b>	Select from numbers 0 to 9 and letters A to E.
<b>Max Packet Size</b>	Select from numbers 0 through 9.
<b>Min Packet Size</b>	Select from numbers 0 through 9.
<b>RF Data Rate</b>	Select 115 kbps for a low RF data rate or 154 kbps for a high data rate. Different rates are available if you selected a high throughput device as your master.
<b>Master Tx Beacon</b>	Select from numbers 0 through 9.
<b>Network ID</b>	Select from 1 through 4095. 255 enables the Call Book.

**Note:** For more information regarding settings, see the user manual for the radio.

7. In the **Template Name** field, give the Gateway device template a name and then click **Finish** to save the template.

After the initial creation of the Gateway radio template is complete, a Master icon appears under the Network Design tab with the previously selected network parameters. To connect devices to the master, see "Connecting Devices to Master Templates in Network Designs" on page 35.

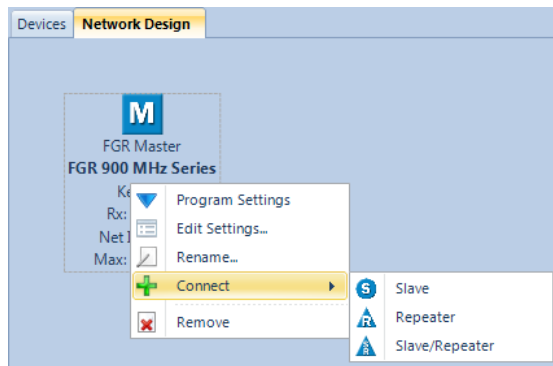


## Connecting Devices to Master Templates in Network Designs

After creating a template for a Master radio in your network, the next step is to connect Slaves, Repeaters, and Slave/Repeaters for programming to the Master in the network design. Devices connected to the Master inherit the master's settings.

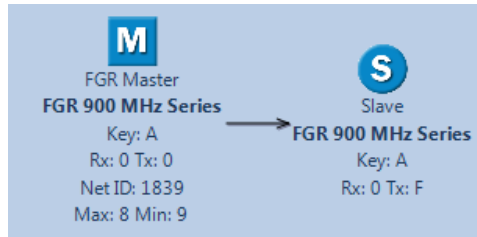
### To connect a serial device:

1. Click **Configuration** in the Applications pane to display the Configuration application.
2. From the Networks area in the Configuration ribbon, select the serial network you want to design and click the **Network Design** tab.
3. Right-click the Master icon, select **Connect**, and select the modem mode of the device to attach.

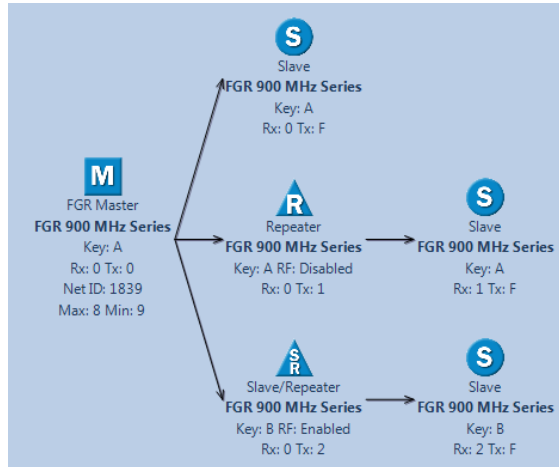


4. In the **Name** field, enter a name that identifies the device.
5. From the **Radio Type** drop-down list, select the device type. All possible types that can connect to the Master are listed.
6. Click **Add**.

An icon for the device displays with the inherent critical settings. For example:



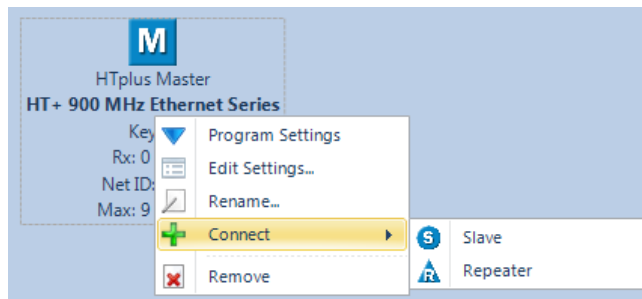
7. To connect another radio to a Repeater or Slave/Repeater, right-click the device icon to which you want to add a connection and repeat the steps above to add a device.



**Note:** If multiple Repeaters or Slave/Repeaters are connected, Tool Suite automatically enables **Repeater Frequency** and assigns a unique frequency key for each subsequent Repeater or Slave/Repeater connected.

#### To connect an Ethernet device:

1. Click **Configuration** in the Applications pane to display the Configuration application.
2. From the Networks area in the Configuration ribbon, select the Ethernet network you want to design and click the **Network Design** tab.
3. Right-click the Master icon, select **Connect**, and select the modem mode of the device to attach.

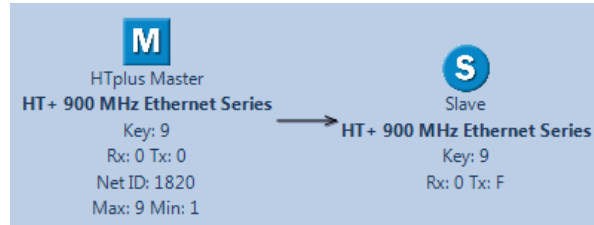


4. In the **Name** field, enter a name that identifies the device.
5. From the **Radio Type** drop-down list, select the device type. All possible types that can connect to the Master are listed.

Many advanced features of the Ethernet devices do not function correctly in networks where Repeaters are enabled. For best operation, FreeWave Technologies, Inc. does not recommend the use of single-radio Repeaters for Ethernet devices.

6. Click **Add**.

An icon for the device displays with the inherent critical settings. For example:



**Note:** One Slave node can be programmed for many radios. There is no need to connect multiple slaves together, when programming, simply change the Radio Name when prompted for the subsequent slave(s) as you program them.

7. To connect another radio to a Repeater, right-click on the radio to add a connection to and repeat the steps to add a Slave connection.

## Editing Settings for Devices in Network Designs

After you add a device to a network design, you can edit each device's settings that were not addressed during the wizard setup. For example, you can change a device's Ethernet settings or baud rate.

1. Click **Configuration** in the Applications pane to display the Configuration application.
2. From the Networks area in the Configuration ribbon, select the network you want to edit and click the **Network Design** tab.
3. Right-click the device you want to change to display the parameter tabs. The same tabs display with the same settings as on the Configuration main window when you select a device.
4. Make the necessary changes and click **Update** to save the settings or **Cancel** to exit without saving any changes.

Tool Suite prompts you to select whether the settings changes affect just the selected radio or all the radios in the virtual network.

5. Click **Yes** to apply the changes to all connected devices in the template, **No** to apply the changes to only the selected device, or **Cancel** to return to the Edit Settings window without applying the changes.

Tool Suite refreshes the devices with the changes.

## Removing Devices From Network Designs

You can delete a group of devices or a single device that does not have another device connected to it from a Network Design. For example, if you remove the Master or a Repeater from the Network Design, all connected devices are deleted as well. If you removing only a Slave (or Endpoint) that is at the end of a network, only that device is deleted.

1. Click **Configuration** in the Applications pane to display the Configuration application.
2. From the Networks area in the Configuration ribbon, select the network you want to remove and click the **Network Design** tab.
3. Right-click the device you want to delete and select **Remove**.
4. Select **Yes** at the prompt to proceed or **No** to cancel without deleting the device.

### Renaming Devices in Network Designs

After a device is added to a Network Design, you can rename the device, as necessary.

1. Click **Configuration** in the Applications pane to display the Configuration application.
2. From the Networks area in the Configuration ribbon, select the network you want to edit and click the **Network Design** tab.
3. Right-click the device and select **Rename**.
4. In the **Name** field, enter the new name and click **Update** to save the change or **Cancel** to exit without making any changes.

Tool Suite prompts you to verify the change.

5. Click **Yes** to proceed with the change or **No** to exit and close out without making a change.

### Printing Network Designs

You can print a network design for review or to keep on file.

1. Click **Configuration** in the Applications pane to display the Configuration application.
2. From the Networks area in the Configuration ribbon, select the network you want to print and click the **Network Design** tab.
3. Right-click in an empty area of the Network Design and select **Print**.  
A print preview window with print options displays.
4. Select the printer to print to and make any printing adjustments, as needed and click **Print**.

### Exporting and Importing Network Designs

You can export a Network Design for use in another instance of Tool Suite. Network Design files have a .fwt extension.

#### To export a Network Design:

1. Click **Configuration** in the Applications pane to display the Configuration application.
2. From the Networks area in the Configuration ribbon, select the network you want to export and click the **Network Design** tab.
3. From the **Options** drop-down menu in the Network Title ribbon, select **Export > FreeWave Network Design**.

You can also right-click in the Network Design window and select **Export Design**.

4. Select the location to where you want to save the file, enter a file name, and click **Save**.

You can now attach the file in an email, add it to an external drive, or place it on a CD.



**To import a Network Design:**

1. Click **Configuration** in the Applications pane to display the Configuration application.
2. From the Networks area in the Configuration ribbon, select the network you want to design and click the **Network Design** tab.
3. If a Network Design exists, right-click in the Network Design window and click **Clear Templates**. After the Network Design area is clear, right-click and select **Import Design**.
4. After the file imports, right-click the desired device for programming and select **Program Settings** while connected to the device to receive those settings.

**Programming Devices From Network Designs**

After the Network Design is complete, you can program the settings on the each device individually. Ensure that the device you want to program is connected to the computer running Tool Suite with the appropriate cable.

1. Click **Configuration** in the Applications pane to display the Configuration application.
2. From the Networks area in the Configuration ribbon, select the network you want to program and click the **Network Design** tab.
3. Right-click the device in the Network Design to program and select **Program Settings**.
4. In the **Radio Name** field (or the **Site Name** field for an Ethernet device) enter the name you want to program to the device and click **Program** to send the settings and the name to the device.

**Note:** Entering a name is optional. You can program the device without entering a name. If you are programming an Ethernet device, you can also send a new IP address by entering the IP address in the **New IP Address** field. Enter the current IP address in the New IP Address field if the address should remain the same.

A status bar displays while the device is being programmed.



When the device is programmed, the device's Carrier Detect (CD) LED displays solid green and the Clear to Send (CTS) LED displays solid red.

After the programming is complete, the Network Design window displays. For each subsequent device in the network that you want to program, connect the serial or diagnostic cable to the radio for programming and repeat steps 3 and 4.

**Note:** One Slave node can be programmed for many radios. There is no need to connect multiple slaves together, when programming. Change the Radio Name when prompted for the subsequent Slaves as you program them.

## Upgrading to the Latest Firmware Version

Use Tool Suite to upgrade the firmware on your devices from one location. If Tool Suite is connected to a device, and a new versions of firmware is available for that device, an indication displays on the Device Information tab in the Configuration application. You can also view the firmware releases available for the devices in your network.

**Note:** Currently Tool Suite does not support over-the-air firmware upgrades or firmware upgrades to Ethernet devices.

### To check the current firmware loaded on devices in a network:

1. Click **Configuration** in the Applications pane to display the Configuration application.
2. From the Networks area in the Configuration ribbon, select the network you want to upgrade. Ensure a serial network is displayed.
3. Click **View Available**, in the Firmware section of the Configuration ribbon to display a list of the latest firmware versions for Tool Suite supported products.

Model	Version	Settings
1.3 GHz P-Series	8.66z	<a href="#">View</a>
1.3 GHz P-Series (Autoslicer)	8.66z	<a href="#">View</a>
FGR 900 MHz Cathodic Protection	2.66cp	<a href="#">View</a>
FGR 900 MHz IO Master	2.66z	<a href="#">View</a>
FGR 900 MHz IO Slave	2.66IO	<a href="#">View</a>
FGR 900 MHz Series	2.66z	<a href="#">View</a>
FGR 900 MHz Short Range	2.66IO	<a href="#">View</a>
FGR2 900 MHz IO Slave	9.70	<a href="#">View</a>
FGR2 900 MHz IO Slave (Enclosed)	9.70	<a href="#">View</a>
FGR2 900 MHz Series	8.73	<a href="#">View</a>
HT 900 MHz Series	7.60	<a href="#">View</a>
I2 2.4 GHz IO Slave	9.70k	<a href="#">View</a>
I2 2.4 GHz Series	8.70j	<a href="#">View</a>
IM 2.4 GHz Cathodic Protection	3.64-SL...	<a href="#">View</a>
IM 2.4 GHz Series	3.66	<a href="#">View</a>

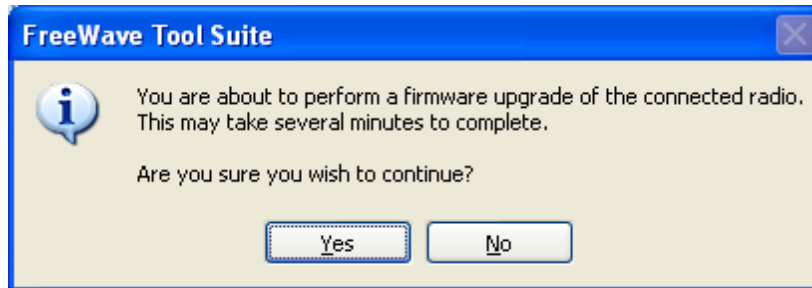
Close

4. Click **View** next to the firmware version to view the settings for the model in that version of firmware.

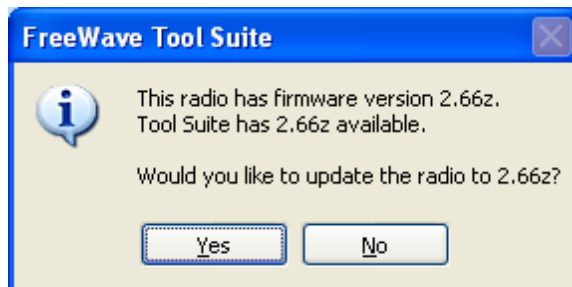
### To upgrade to the latest firmware version:

1. Click **Configuration** in the Applications pane to display the Configuration application.
2. From the Networks area in the Configuration ribbon, select the network you want to upgrade. Ensure a serial network is displayed.

3. Connect to the device you want to upgrade.
4. Click **Upgrade** in the Firmware section of the Configuration ribbon.
5. Click **Yes** at the prompt to proceed or **No** to cancel without installing the new firmware.

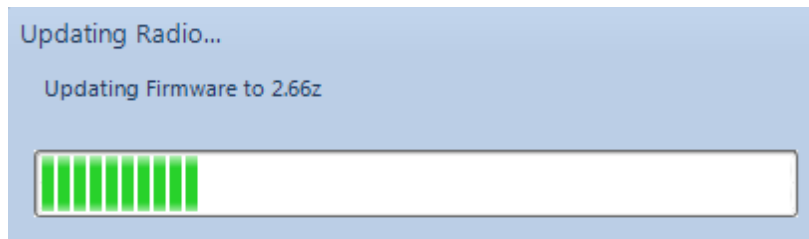


Tool Suite identifies and displays the firmware version that is loaded on the connected device and displays the latest version of firmware available for that model.



6. Click **Yes** to proceed with the upgrade, or **No** to exit.

The system displays the progress of the firmware upgrade:



After complete, a message displays that the firmware upgrade was successful.



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## Chapter 4: Network Diagnostics Application

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Network Diagnostics provides a place to view diagnostic data for all the devices connected to the Master in your network in real time. This application is not meant to replicate the functionality of an NMS system, but rather it is a tool that can be used for diagnostics and troubleshooting in the field.

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**Important:** The Network Diagnostics application is intended for occasional network monitoring or troubleshooting, not for continuous, long-term collection of diagnostic data. Aggressive polling by the Network Diagnostics application or polling during periods of heavy data traffic may cause degradation in data throughput.

Tool Suite **is not** optimized for the collection and management of large amounts of diagnostic data from continuous polling. Collection of excessive amounts of data results in overall performance degradation in Tool Suite.

Finally, you can poll multiple networks simultaneously, however this is not recommended. Depending on the number and size of networks being polled, Tool Suite may experience performance degradation or instability.

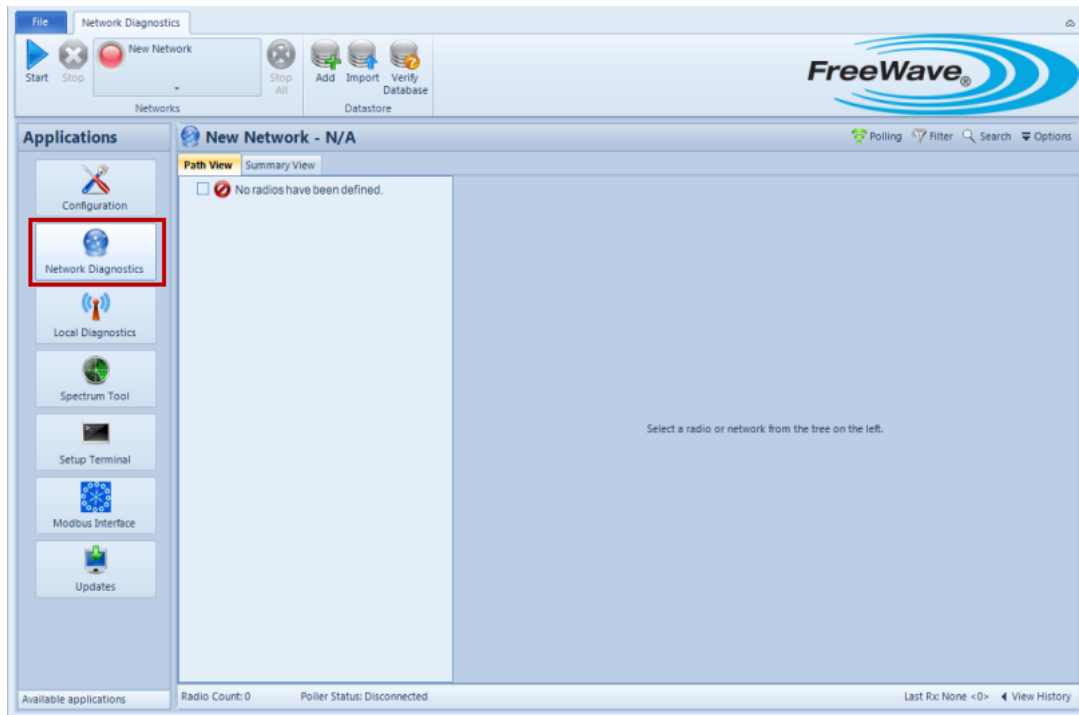
Review the "Network Diagnostics Best Practices" on page 44 before using the application.

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This chapter discusses the following about the Network Diagnostics application:

- Path View and what displays in it.
- Polling and searching for devices in your network.
- Setting the parameters that you want to monitor and determining what flags a device as having an alert or warning.
- Running and viewing network diagnostic data.

Click **Network Diagnostics** in the Applications pane to get started.



### Network Diagnostics Best Practices

Because there are several variables involved, FreeWave cannot provide a one-size-fits-all recommendation for all settings when running Network Diagnostics. Each situation is different, and you will need to determine the settings and usage pattern that work best for you. FreeWave does recommend following the best practices below for optimum network stability and performance, as well as Tool Suite stability and performance:

- Use Network Diagnostics only for occasional monitoring or troubleshooting, not continuously.
- Poll **only** one network at a time.
- Poll networks at times of low data throughput. (Turn the polling host off or poll between scheduled SCADA polls.)
- Increase polling intervals to reduce the number of diagnostic polls injected into the network and reduce the amount of diagnostic data collected. For example, change from the default of 200 ms to 2000 ms unless discovering a new network.
- Set networks to clear diagnostics after the shortest acceptable time interval.

### Discovering and Reading Devices

To run diagnostics using the Network Diagnostics application you must poll the network for the devices that are available and the devices current settings.

**Note:** Prior to running diagnostics for your network, you must define the network you want to diagnose. For more information, see "Creating Configuration and Network Diagnostics Networks" on page 13.

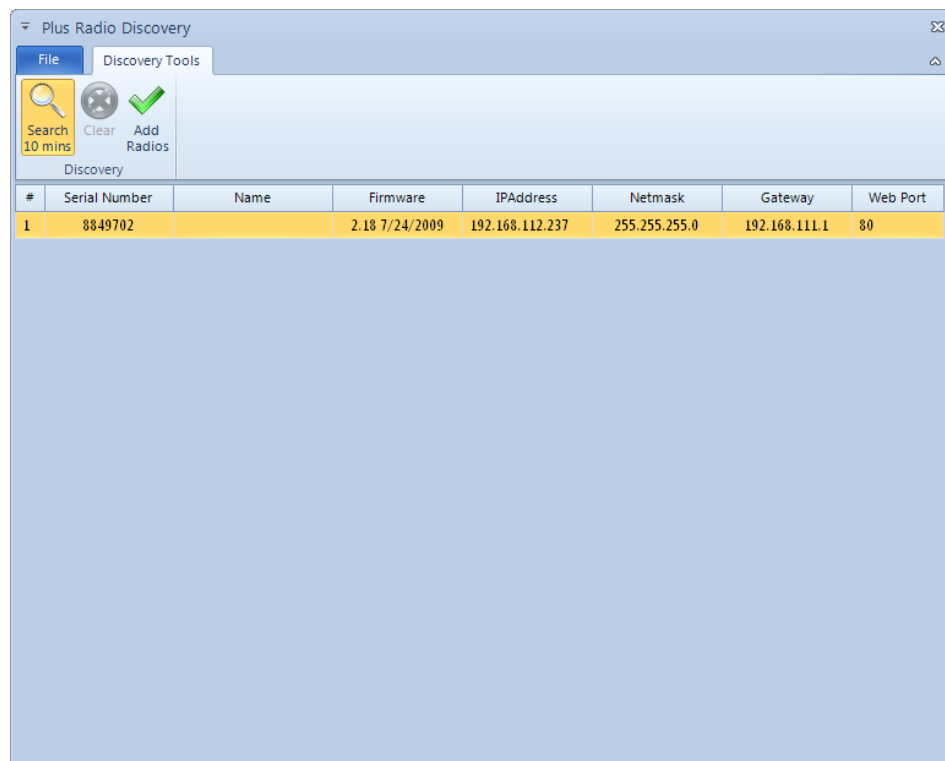
## Discovering Ethernet Devices

To search for Ethernet devices available to add to your diagnostic network, you can run a discovery for all devices available.

1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. From the drop-down menu in the Networks section of the ribbon, select an Ethernet network.
3. From the **Options** drop-down menu in the network title ribbon, select **Discover Radios** to display the Plus Radio Discovery window.
4. Click **Search** and select a length of time to automatically stop searching for devices.

To stop searching before the allotted time, click **Search** again.

Devices discovered in the network display in the device list.



5. To add the devices listed to the diagnostic network, click **Add Radios**.

To clear the discovery list, click **Clear**.

The devices you add display in the Path View for the network. For more information, see "Network Diagnostics Path View" on page 46.

## Reading Ethernet Device Settings

When running diagnostics on an Ethernet network, you can poll all devices in the network for settings, name, and firmware versions.

**Note:** Polling for a device's Name and firmware version is only available on Ethernet devices running firmware versions 2.18 and above.

**To read an Ethernet device for settings:**

1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon, select an Ethernet network.
3. From the **Options** drop-down menu in the Network Title ribbon, select **Read > All Radios**.
4. Tool Suite reads the settings from all Ethernet devices available in the network.

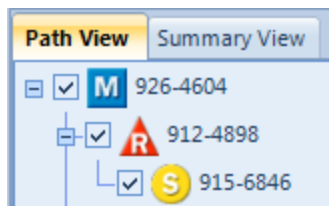
**To read an Ethernet device for its name and Firmware version:**

1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon, select an Ethernet network.
3. From the **Options** drop-down menu in the Network Title ribbon, select **Read > Name/Firmware Version**.
4. Tool Suite reads the name and current firmware version installed on all Ethernet devices available in the network.





## Network Diagnostics Path View

The Path View tab displays a tree view of devices, and their Master/Repeater/Slave hierarchy in the network. The devices display in the tree whether they were added manually or through a discovery feature.

The icons next to the devices help to identify where they fall in the network hierarchy. In addition, the color of each icon indicates whether the device is in an warning or alarm status. For more information, see "About Alerts " on page 47.



The devices in the Path View display with one of the following icons:

-  M Icon - Indicates a Master in the network.
-  S Icon - Indicates a Slave in the network.
-  R Icon - Indicates a Repeater in the network.
-  S/R Icon: Indicates a Slave/Repeater in the network.



Each device in the Path View has a check box. When a device's check box is selected, the device gets actively polled when the network is set to poll. Devices whose check box is not selected are excluded from polling. All related devices linked to a Master are selected or unselected when the Master in the hierarchy is selected or unselected. Use **Ctrl + left-click** to change the selection for a single device in the tree.

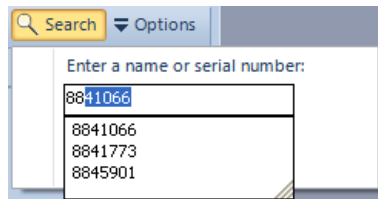
## Searching for Devices in the Network

If you have a large network, use the Search option to locate the device in the Path View in the Network Diagnostics application.

1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon, select the network you want to search.
3. Click the **Search** option in the Network Title ribbon.
4. Enter a device name or a serial number. If you are searching in an Ethernet network, you can also search by IP address of the device using the **Enter an IP Address** field.

**Note:** Enter serial numbers without a dash.

As you type in the search fields, Tool Suite searches for devices that match your search criteria and displays the matches in a list. Select a matching device at any time to jump to it in the Path View. Continue to type more text to refine the search results.





If Tool Suite finds a single device that matches the search criteria you enter, it jumps to the device and highlights it in the Path View.

## About Alerts

When you run network diagnostics, Tool Suite polls the devices for the parameters described in "Parameter Definitions and Recommended Values" on page 53. Use alert definitions to enter the parameters and settings that you want to be visually notified about if the condition occurs in your network.

For example, if you want Tool Suite to alert you when a device's voltage goes above the recommended limit, you can set up an alert as either a warning or alarm.

As you run diagnostics and poll the devices in your network, if a device has a parameter that sends it into an alert or warning status, the device's icon in the Path View reflects the state of the device, providing you an instant visual queue that a condition exists.

-  - The device is in an alarm state.
-  - The device is in a warning state.

**Note:** If the device displays with a blue icon, it has no alarms or warnings or all alarms or warning have been marked as acknowledged. For more information, see "Acknowledging and Clearing Alerts" on page 49.



You can drill into each device that has an alert state to review the details about the alert, the data received during the poll of the device, and the time that poll took place. Use this information to help troubleshoot the device's error.

To work with alerts, first set the parameters you want to monitor.

### Setting Alert Definitions

Alerts are categorized as either warnings or alarms. The set of diagnostic parameters you can set as warnings or alarms is the same. Where you activate the alert determines whether Tool Suite displays the condition as a warning or an alarm in the Network Diagnostics application.

**Note:** The network must be stopped before you can modify the alert definitions.

1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon, select the network for which you want to define alert definitions.
3. If necessary, click **Stop** to stop polling the network.
4. From the **Options** drop-down menu in the network title ribbon, select **Alert > Modify Alert Definitions** to display the Alert Definitions window.
5. To define parameters that flag a device with a Warning  , click the **Warnings** tab and set your definitions there. To define parameters that flag a device with an Alarm  click the **Alarms** tab.
6. To activate a warning or alarm for a device condition, select the check box in the Active column for the diagnostic.
7. In the **Warn Below** and **Warn Above** fields for the diagnostics that you activated, set the range in which something is considered in fault.

For example, if you set the **Warn Below** field for the **In Margin** diagnostic to **20.00** in the Warnings tab, if the device's margin falls below **20.00** dB, the system flags the device with a warning in the Network Diagnostics application and changes the device icon to yellow in the Path View.

Alert Definitions

**Warnings** Alarms

	Field	Warn Below	Warn Above	Active
►	In Signal			<input type="checkbox"/>
	In Noise			<input type="checkbox"/>
	Out Signal			<input type="checkbox"/>
	Out Noise			<input type="checkbox"/>
	In Margin	20.00		<input checked="" type="checkbox"/>
	Out Margin	20.00		<input checked="" type="checkbox"/>
	Voltage			<input type="checkbox"/>
	Temperature			<input type="checkbox"/>
	Missed Polls		10.00	<input checked="" type="checkbox"/>
	VSWR		30.00	<input checked="" type="checkbox"/>
	Receive %	80.00		<input checked="" type="checkbox"/>
	Diag Poll/Transmit %			<input type="checkbox"/>

Update

Close

Set Defaults

If you set the **Warn Below** field for the **In Margin** diagnostic parameter to **20.00** dB in the Alarms tab, if the device's margin falls below 20.00 dB, the system flags the device with an Alarm in the Network Diagnostics application and changes the device icon to red in the Path View.

## Acknowledging and Clearing Alerts

As you are reviewing devices that are in an alert state, you can acknowledge an alert so the device no longer displays in an alert state. For example, you might acknowledge a warning if you understand why the device has that warning and are working on the solution. Acknowledged alerts still display in the list of alerts for a device in the Alerts tab, however, they do not cause the device's icon to change color in the Path View.

After you have resolved the condition causing an alert, you can clear the alert. Clearing the alert removes the alert from the alert list in the Alert tab.

### To acknowledge individual alerts on a device:

1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon, select the network in which you want to acknowledge alerts.
3. Select the device that is in an alert state and click the **Alerts** tab at the bottom of the main window to display the list of alerts for device.
4. Select the check box in the **Ack'd** field next to the alerts you want to acknowledge.
5. Click **Acknowledge Alerts**.

The alert indicator for the device in the Path View is removed. The alerts remain in the Alerts list for your reference.

**To acknowledge all alerts on a device:**

1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon, select the network in which you want to acknowledge alerts.
3. Select the device that is in an alert state and click the **Alerts** tab at the bottom of the main window to display the list of alerts for device.
4. From the **Options** drop-down menu in the network title ribbon, select **Alerts > Acknowledge All Alerts**.

The alert indicator for the device in the Path View is removed. The alerts remain in the Alerts list for your reference.

**To clear an alert:**

1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon, select the network in which you want to clear alerts.
3. Select the device for which you want to clear alerts and click the **Alerts** tab at the bottom of the main window to display the list of alerts for device.
4. Click **Clear Alerts**.

The alert indicator for the device in the Path View is removed and all the alerts are cleared from the Alerts list.

## **Showing Only Devices With Alerts**

Use the filtering option to view only devices in the Path View in that are in an alert status.

1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon, select the network in which you want to view devices with alerts.
3. From the **Filter** drop-down menu in the network title ribbon select from one of the following options:
  - **Show Alerts** - Shows all devices with an alarm or warning in the Path View.
  - **Show Warnings** - Shows only devices with a warning condition in the Path View.
  - **Show Alarms** - Shows only devices with an alarm condition in the Path View.

To return to an unfiltered view, select **Show All** from the **Filter** menu.

## **Polling Devices With Alerts**

If you are troubleshooting a device in an alert state, you can poll only the devices in your network that currently have alarms or warnings.

**To poll only devices with alerts:**

1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.

2. In the Networks section of the Network Diagnostics ribbon, select the network in which you want to poll devices with alerts.
3. From the **Polling** drop-down menu in the network title ribbon select from one of the following options:
  - **Poll Radios With Alerts** - Polls only the devices with an alarm or warning condition.
  - **Poll Radios With Warnings** - Polls only devices with a warning condition.
  - **Poll radios With Alarms** - Polls only devices with an alarm condition.

## Creating Alert Reports

Generate a report by date range of devices in a network that are in alert state. Using a report lists the devices by serial number and provides a way to print, save as a PDF file, or to view the devices with alerts in Microsoft Excel. Reports can be helpful if troubleshooting multiple devices or comparing a troubled device with others that are not in an alert state.

1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon, select the network in which you want to create an alert report.
3. From the **Options** drop-down menu in the Network Title ribbon, select **Alerts > View Report**.
4. In the Alert Reporting window, enter the date range for which you want to include alarm data in the report. For example, if you want to see alarm data for the last month, enter the first and last days of that month in the corresponding fields.
5. From the **Alert Level** drop-down list, select from one of the following options:
  - **All** - Includes all alerts that occurred for the device in the date range you specify.
  - **Warnings** - Includes only warnings that occurred for the device in the date range you specify.
  - **Alarms** - Includes only alarms that occurred for the device in the date range you specify.
6. Click **Report** to generate the report.

The Report displays in a separate window and sorts by serial number.



Network		FW Version	Radio Type	Network Type	Type	Field	Above	Below	Value	First Alert	Last Alert	Ack
FreeWave FGR Network		2.66	FGR 900 MHz Series	Slave								
926-4318					Warning	VSWR	30.00		69.00	12/22/2009 10:11:30 AM	12/22/2009 10:13:22 AM	True

## Running and Viewing Network Diagnostics

**Important:** Review the "Network Diagnostics Best Practices" on page 44 before running the Network Diagnostics application.

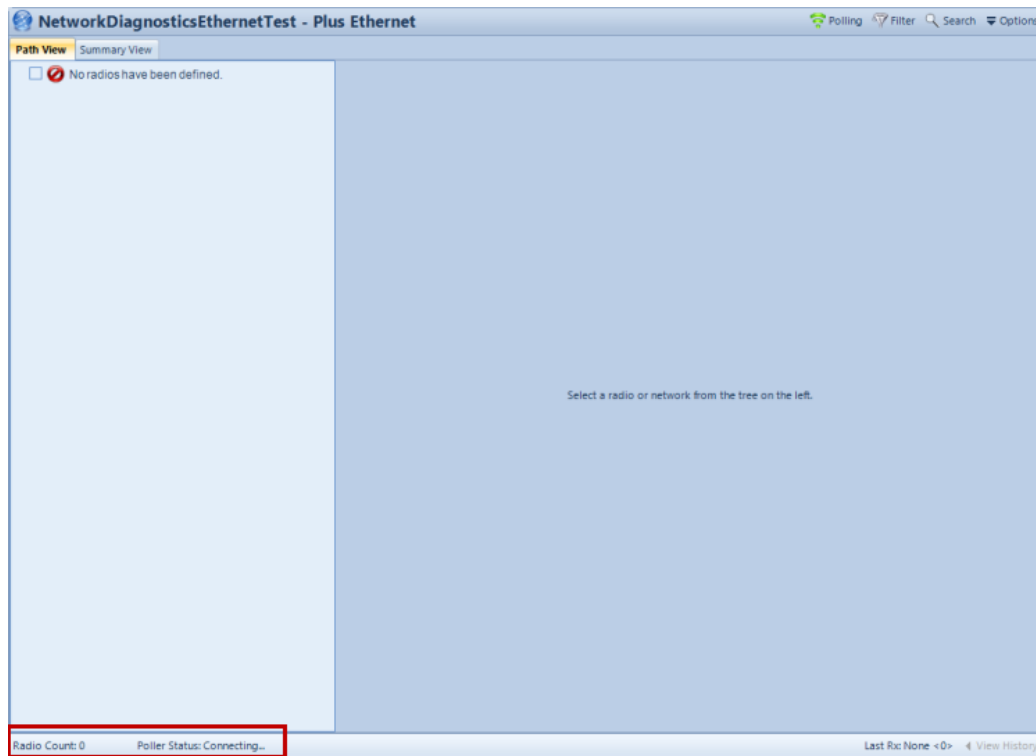
After a network is defined, select the network from the Networks section of the Network Diagnostics ribbon and click **Start** to begin gathering diagnostic data.

As Tool Suite receives information from the devices in the network, it populates the Path View and the graph for the selected device begins to display information showing how the device is functioning. Tool Suite offers multiple ways to review network diagnostic data.

**Note:** If you are running diagnostics on an Ethernet network, note that broadcasts may be blocked through certain brands of routers. If data is not displaying in Tool Suite and other factors have been ruled out, try connecting the Ethernet cable directly to the computer's Ethernet port.

- **Graph view** - Displays all the current data in a chart. See "Using the Network Diagnostics Graph View" on page 55.
- **Summary view** - Provides the most recent diagnostics in summary table format. See "Using the Network Diagnostics Summary View" on page 58.
- **Trend Analysis view** - Displays a trend analysis of the parameters polled in past network diagnostic runs. See "Using the Network Diagnostics Trend Analysis View" on page 59.
- **History view** - Displays an at-a-glance history of the parameters polled in past network diagnostic runs. This view is only available in serial and TCP networks. See "Using the Network Diagnostics History View" on page 58.

The Poller Status located at the very bottom of the window indicates if the poller is connected or disconnected. If the poller is connected, but no radios are added to the Path View, double check that the diagnostic cable is connected to the Master radio.



## Parameter Definitions and Recommended Values

As you use the Network Diagnostics application, the following parameters are available in each of the views. refer the following parameter definitions and the recommended values for each. For more information about each of these parameters in a particular device, see that device's user manual or addendum.

Parameter	Description
<b>Inbound Signal</b>	The signal the Slave or Repeater receives from the Master or Repeater to which that device is linked.
<b>Inbound Noise</b>	The noise at the selected Slave or Repeater.
<b>Outbound Signal</b>	The signal the Master or Repeater receives from the Slave.
<b>Outbound Noise</b>	The noise in the outbound transmission at the Master or Repeater
<b>In/Out Margin</b>	<p>The difference between the signal and noise. <b>In Margin</b> is the spread of points between the <b>Inbound Noise</b> and <b>Inbound Signal</b>. FreeWave recommends a minimum of 20 dB. This recommendation means the signal needs to be 20 dB higher than the noise level.</p> <p><b>Out Margin</b> is the spread of points between the <b>Outbound Noise</b> and <b>Outbound Signal</b>.</p> <p>A spread of 20 dB or greater is considered ideal.</p>

Parameter	Description
<b>Voltage</b>	The input voltage the device receives. This value should be within the specified range of the device that is being read. For example, FGR series radios should be between the 6 and 30 Volts DC.
<b>Temperature</b>	The physical temperature of the device.
<b>VSWR</b>	The amount of signal being reflected back into the device. A reading between 0 and 5 is considered good; between 6 and 25 is Fair; between 26 and 30 or higher is considered Poor and needs attention.
<b>Receive %</b>	The percentage of data packets that were successfully transmitted from the Master to the Slave on the first attempt. A number of 75 or higher indicates a robust link that provides very good performance even at high data transmission rates. A number of 15 or lower indicates a weak or marginal link that provides lower data throughput. An <b>Overall Receive Rate</b> of 100% provides approximately 100 KBaud of bandwidth with an <b>RF Data Rate</b> setting of <b>3</b> and approximately 150 KBaud of bandwidth with an <b>RF Data Rate</b> of <b>2</b> . These numbers are reduced approximately 50% if one or more Repeaters are in the network.
<b>Diag Poll % (serial only)</b>	The percentage of the time that the radio reported back diagnostics data when polled. If the device transmits a lot of data as part of its normal operation, it has less time to respond to the Master polling it for diagnostics data; in that case, the diagnostics response rate decreases. If this value is 0, it may be because this device is disconnected from the network.
<b>Transmit % (Ethernet only)</b>	The percentage of packets the device sends sent that successfully reach the upstream device (Gateway or a Repeater). This statistic shows 0.00% on a Multipoint Gateway or Multipoint Repeater. This statistic is only valid on Multipoint Endpoint devices. FreeWave recommends a minimum of 75% for proper device operation.

### Polling Devices for Diagnostics

If devices are not automatically discovered, or the settings have not populated in the Network Diagnostics application, you can manually poll a single device to discover it and/or the device's settings. While polling an active Ethernet network, you can poll a range of IP addresses the network spans to discover devices.

To poll a device, Tool Suite must be actively polling the network. The polling indicator light displays a green light when Tool Suite is polling a network and a red light if the network is disconnected.

#### To poll serial devices for diagnostics:

1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon, select the network in which you want to poll devices.
3. From the **Options** drop-down menu in the Network Title ribbon, select **Poll Radio**.



4. In the **Serial Number** field, enter the serial number of the device you want to poll.
5. Click **Poll** to poll the device or click **Cancel** to exit without polling the device.

**To poll for Ethernet devices for diagnostics:**

1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon, select the network in which you want to poll devices.
3. From the **Options** drop-down menu in the Network Title ribbon, select **Poll Radio**.
4. In the **Start Address** and **End Address** fields, enter the first and last IP addresses in a range of addresses for which you want to poll devices.
5. Click **Poll** to poll the range of addresses or click **Cancel** to exit without polling the device.

The polled Ethernet devices display in the Path View window pane once discovered.

**Using the Network Diagnostics Graph View**

You can view the data from a network diagnostic in graph form. Tool Suite charts all the current data for the device on a single graph. You can zoom in and out on different parts of the graph for greater magnification. The graph contains the following data across the top of the graph.

- **Last Response** - Displays the date and time for the last time the radio responded to a poll.
- **Missed Polls** - Tracks the number of times Tool Suite polled the device without a response. After there is a successful poll, the **Missed Polls** number resets to zero.
- **Data Sent** - Only available for Ethernet networks, **Data Sent** tracks the increasing number of polls a radio has sent out. When running diagnostics for Serial devices, the **Data Sent** number remains at zero.

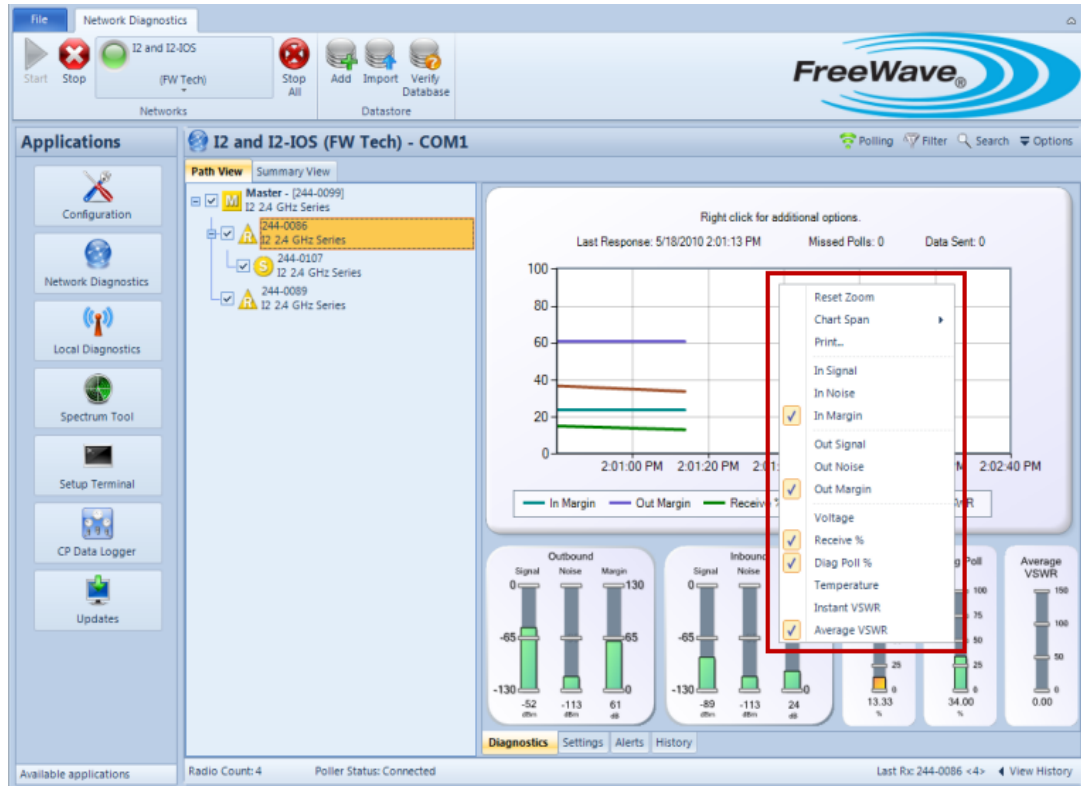


### To display the graph view:

1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon that contains the device you want to view.
3. In the Radio tree view, select the device you want to review.
4. Click the **Diagnostics** tab at the bottom of the Network Diagnostics window.

### To change the data displayed in the graph:

1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon that contains the device you want to view.
3. In the Radio tree view, select the device you want to review.
4. Right-click anywhere in the graph and select the parameters you want to view or deselect the parameters you no longer want to view:

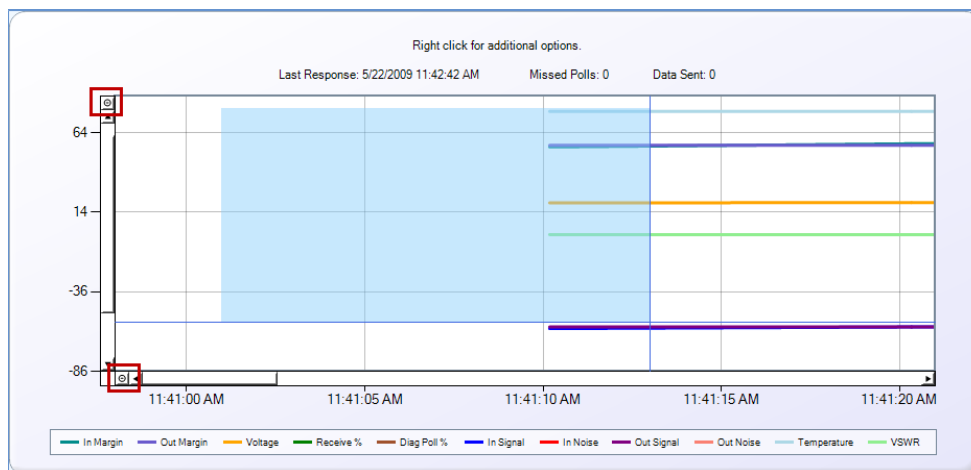


To change the time period displayed in the graph, select **Chart Span** and the time period to display.

#### To zoom in and out in the graph:

1. With the graph displayed, hold down the left button on the mouse at the uppermost or lowest point of the area on the graph in which you want to zoom.
2. Drag the mouse across the entire area on which you want to zoom.

To zoom out, click the **O** in either the top upper left corner (controls zooming out at the Y-axis) and/or the lower left corner (controls zooming out at the X-axis) of the graph.



**Note:** The number of times the graph was magnified equals the number of times you need to click either one of the reset points to return the graph to the normal view.

## Using the Network Diagnostics Summary View

The Summary view displays the most recent polls and provides an overview of all the diagnostics on a single page. From the Summary view, you can copy and paste data into a Microsoft Excel spreadsheet.

Serial and TCP/IP Summary View:

FreeWave FGR Network - COM4																	
Path View Summary View																	
Radio	Polling	Role	Last Response	Missed Polls	Diag %	In Δ	Out Δ	Rx %	Avg VSWR	Data Tx	Temp	Voltage	Distance	Model	PW Version	Connected	Disconnects
926-4604	<input checked="" type="checkbox"/>	Master	12/23/2009 2:03:47 PM	0	100	N/A	N/A	N/A	0	0	79.81	11.93	0.00	FGR 900 MHz Series	2.66	N/A	N/A
912-4898	<input checked="" type="checkbox"/>	Repeater	12/23/2009 2:03:47 PM	0	100	48	58	100.00	0	0	83.57	11.81	4,475.00	FGR 900 MHz Series	2.66	926-4604	2
925-5795	<input checked="" type="checkbox"/>	Repeater	12/23/2009 2:03:47 PM	0	100	27	36	100.00	0	0	80.43	12.06	4,191.00	FGR 900 MHz Series	2.66	926-4604	1
926-4318	<input checked="" type="checkbox"/>	Slave	12/23/2009 2:03:39 PM	0	100	31	24	98.43	0	0	79.19	11.93	4,191.00	FGR 900 MHz Series	2.66	925-5795	1
915-6846	<input checked="" type="checkbox"/>	Slave	12/23/2009 2:03:45 PM	0	100	49	55	100.00	0	0	79.81	12.19	4,475.00	FGR 900 MHz Series	2.66	912-4898	2

Plus Ethernet Summary View:

FreeWave Plus Network - Plus Ethernet																	
Path View Summary View																	
Radio	IP Address	Polling	Role	Last Response	Missed Polls	Diag %	In Δ	Out Δ	Rx %	Tx %	Avg VSWR	Data Tx	Data Rx	Temp	Voltage	Distance	Model
M1 [884-1773]	192.168.111.199	<input checked="" type="checkbox"/>	Gateway	12/23/2009 1:56:02 PM	5	95	48	N/A	N/A	N/A	1	522.886	511.956	88.60	14.35	0.00	HT+ 900 MHz Etherne...
S2 [884-5901]	192.168.111.201	<input checked="" type="checkbox"/>	End Po...	12/23/2009 1:56:10 PM	0	100	61	48	100.00	100.00	1	750.162	1,987.892	98.60	15.49	0.00	HT+ 900 MHz Etherne...
M2 [884-1066]	192.168.111.203	<input checked="" type="checkbox"/>	End Po...	12/23/2009 1:56:09 PM	1	99	88	48	100.00	100.00	0	14.340	607.729	98.60	15.37	0.00	HT+ 900 MHz Etherne...

To display the Summary view:

1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon that contains the device you want to view.
3. In the Radio tree, select the device you want to review and click the **Summary** tab.

To copy data to a Microsoft Excel spreadsheet:

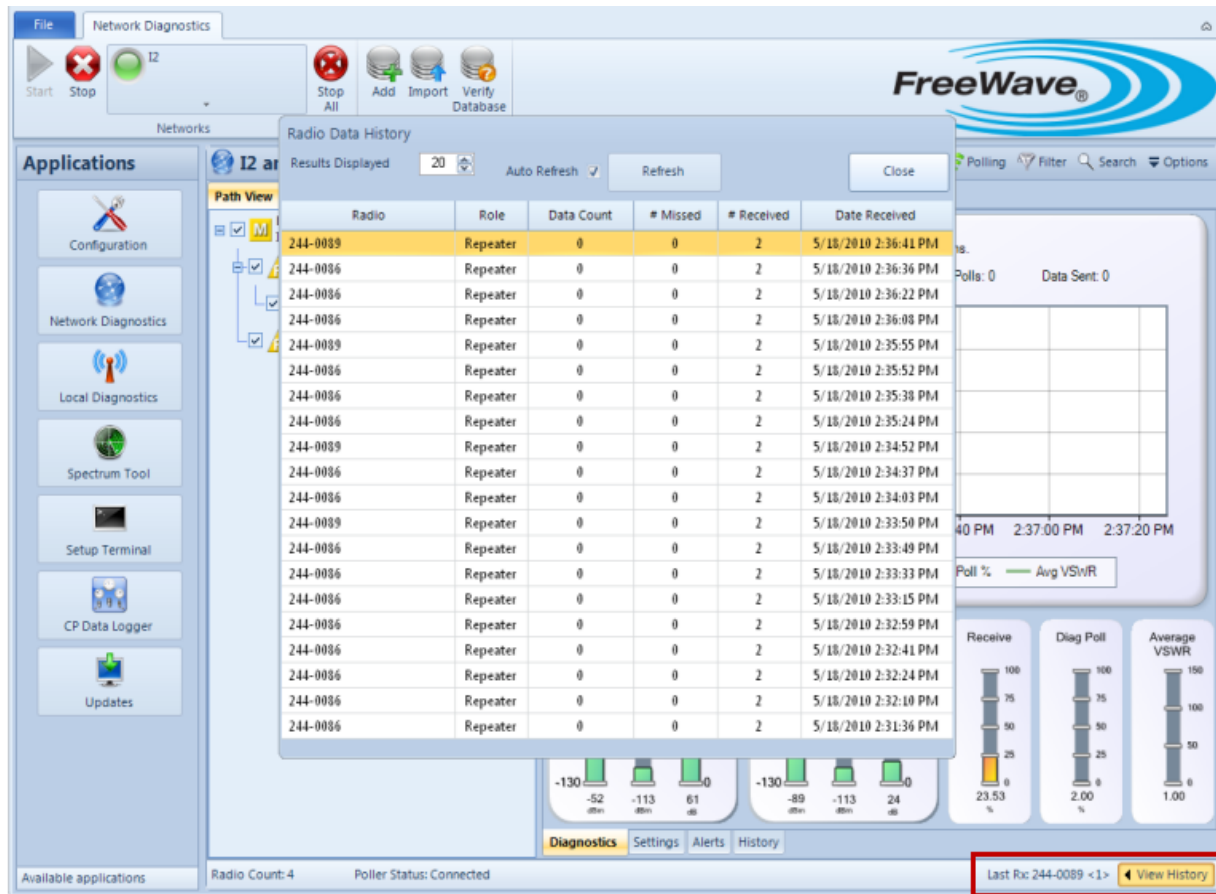
1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon that contains the device you want to view.
3. In the Radio tree, right-click the device and choose **Select All**, and copy and paste the information into an Microsoft Excel Spreadsheet.

## Using the Network Diagnostics History View

The History view displays a log of Slaves/Endpoints that recently transmitted data. This view is most useful if your network contains a "Chatty Slave." Use this view to review a pattern of repeated data transmissions.

**Note:** This feature is only available in serial and TCP/IP networks.

The last received radio is displayed next to the View History button.

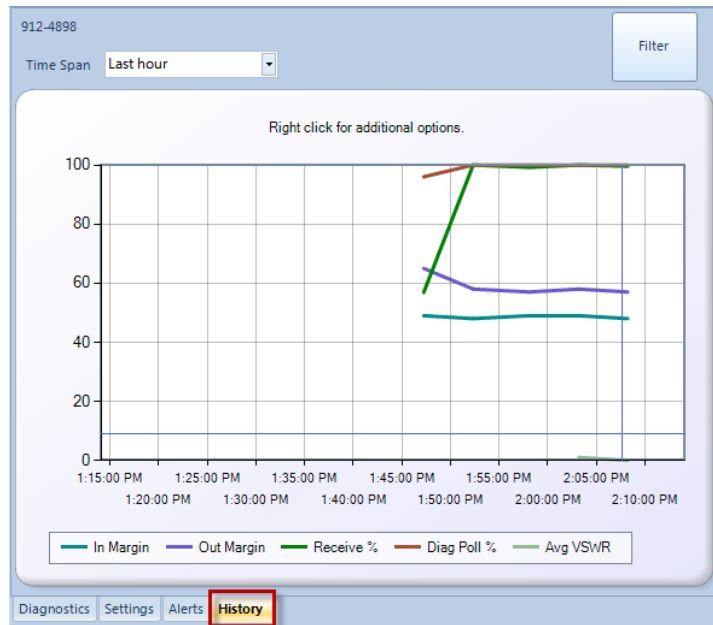


1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon that contains the device you want to view.
3. in the Radio tree view, select the device you want to review.
4. Click **View History** at the bottom of the Network Diagnostics window.
5. In the **Results Displayed** field, select how many results to display, 10 to 100. .
6. To manually refresh the history list, click **Refresh**.

If the **Auto Refresh** check box is selected, the list automatically updates.

### Using the Network Diagnostics Trend Analysis View

The Trend Analysis view shows an analysis of reported data for the time you specify to view.

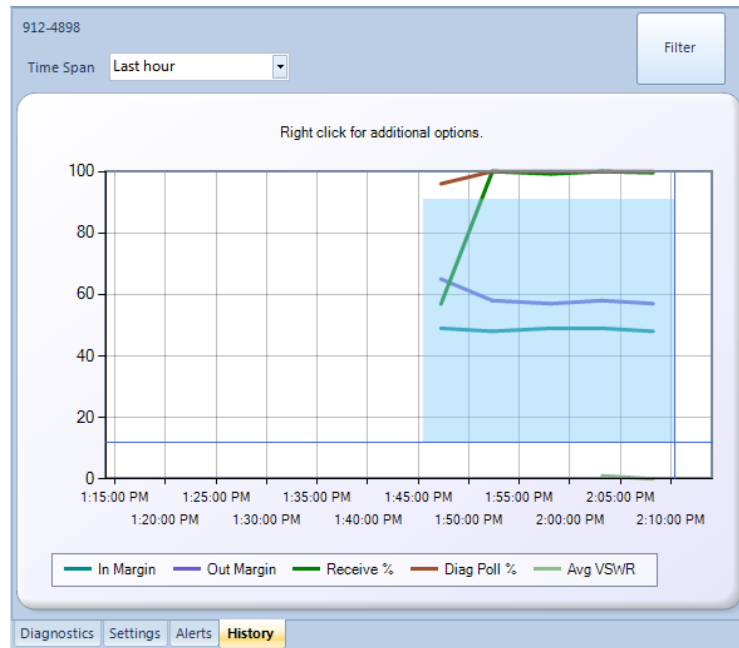


### To display the Trend Analysis view:

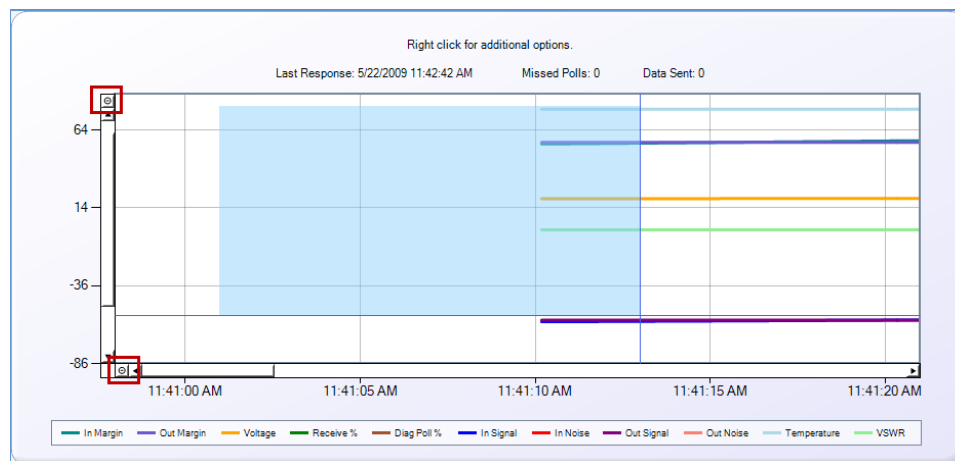
1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon that contains the device you want to view.
3. In the Radio tree view, select the device you want to review.
4. Click the **History** tab at the bottom of the Network Diagnostics window.
5. In the **Time Span** field, select the time period for which you want to display data.

### To zoom in and out in the Trend Analysis:

1. With the graph displayed, hold down the left button on the mouse at the uppermost or lowest point of the area on the graph in which you want to zoom.
2. Drag the mouse across the entire area on which you want to zoom.



To zoom out, click the **O** in either the top upper left corner (controls zooming out at the Y-axis) and/or the lower left corner (controls zooming out at the X-axis) of the graph.



**Note:** The number of times the graph was magnified equals the number of times you need to click either one of the reset points to return the graph to the normal view.

## Changing Settings Over the Air

Within the Network Diagnostics application, you can view a device's current configuration and change the following settings over the air:

- Operation Mode
- Baud Rate
- Transmission Characters
- Multipoint Parameters

**Note:** As of Tool Suite release 2.6.0, you can also change an Ethernet's settings over the air.

When making changes, always start at the farthest site in the line, for example, the Slave farthest from the Master.

1. Click **Network Diagnostics** in the Applications pane to display the Network Diagnostics application.
2. In the Networks section of the Network Diagnostics ribbon, select the network that contains the device you want to change.
3. In the Radio tree view, select the device you want to change.
4. Click the **Settings** tab at the bottom of the Network Diagnostics window to display the device's current settings.
5. In the parameter field you want to change, make the necessary changes.
6. Right-click in the field to change and select **Change**.
7. Answer **Yes** at the prompt to continue or **No** to exit without making any changes.

While the change is being sent to the device, a warning icon displays next to the field that is changing.

912-4898 - FGR 900 MHz Series Firmware: 2.66

(0) Operation Mode (1) **Baud Rate** (3) Transmission Characteristics (5) MultiPoint Parameters

Baud Rate	115200
Data Parity	8 - None - 1
Modbus RTU	0
Serial Interface	RS232
Setup Port	Both
Turn On Delay	⚠ 0
Turn Off Delay	0
Flow Control	None
Use Break to Access Setup	Off

Diagnostics **Settings** Alerts History

The new value displays in the field and the warning icon no longer displays when the settings as changed.

If the value does not show right away, try polling the radio to make sure the setting was changed.



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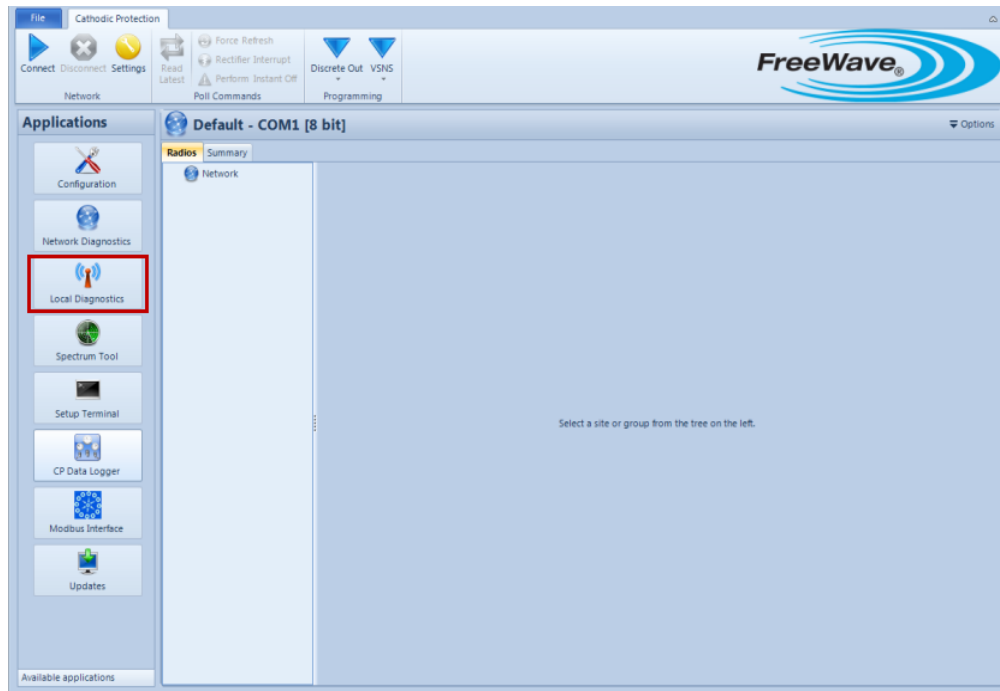
## Chapter 5: Local Diagnostics Application

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The Local Diagnostics application presents a real-time snapshot of MultiPoint setups that measure the signal -to-noise level of the device. This information may be read from a Slave, Repeater, or Slave/Repeater device. Use local diagnostic information to help direct a directional antenna of a Slave device by tracking the signal and noise levels as the antenna is aimed back at the Repeater or Master.

**Note:** To run Local Diagnostics you must set the connected device's **Diagnostics** parameter (located in the MultiPoint Parameters tab in the Configuration application) to a value greater than zero.

Click **Local Diagnostics** in the Application pane to get started.



### Running Local Diagnostics

The Local Diagnostics application presents a real-time snapshot of MultiPoint setups that measure the signal-to-noise level of the device. It presents the data in both a graph form and with values in a table above the graph.

#### To run a local diagnostic:

1. Click **Local Diagnostics** in the Applications pane to display the Local Diagnostics application.
2. In the **Port Speed** field in the Local Diagnostics ribbon, select the speed of the port to which the device is connected.
3. In the **Com Port** field in the Local Diagnostics ribbon, select the Com port to which the device is connected.
4. Click **Start** in the Local Diagnostics ribbon to begin running the diagnostic.

#### To stop a local diagnostic:

1. Click **Local Diagnostics** in the Applications pane to display the Local Diagnostics application.
2. Click **Stop** in the Local Diagnostics ribbon.

### Printing Local Diagnostics

In Tool Suite version 2.4.0 and above, you can print the current view of the local diagnostics graph.

1. Click **Local Diagnostics** in the Applications pane to display the Local Diagnostics application.

2. Click **Print** in the Local Diagnostics ribbon to display a print preview of the graph.
3. To print the graph, click the Printer icon in the upper left corner of the print preview window.  
The document is sent to the default printer defined on your computer.



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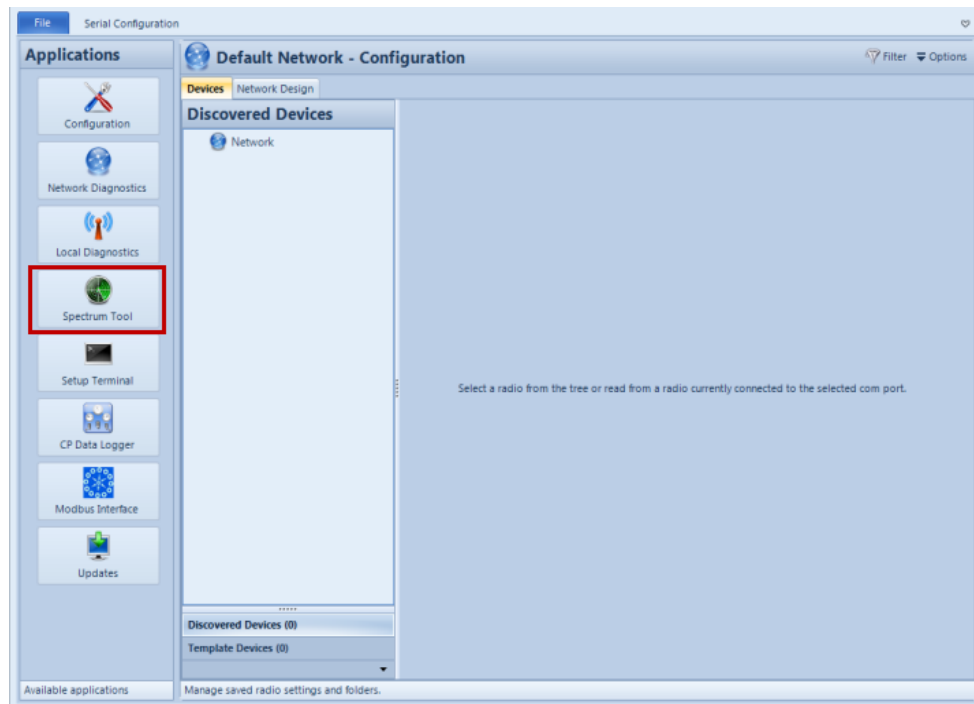
## Chapter 6: Spectrum Tool Application

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The Spectrum Tool application puts a supported serial device into a listening mode that monitors the ambient noise at various spectrum points as the radio hops through them.

The Spectrum Tool application is only available for 900 MHz, 2.4 GHz, and 1.3 GHz serial devices.

Click **Spectrum Tool** in the Applications pane to get started.



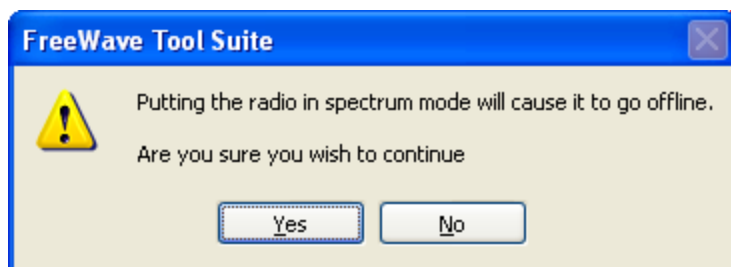
## Running a Spectrum Analysis

Use the Spectrum Tool to monitor the ambient noise at various spectrum points as the radio hops through them.

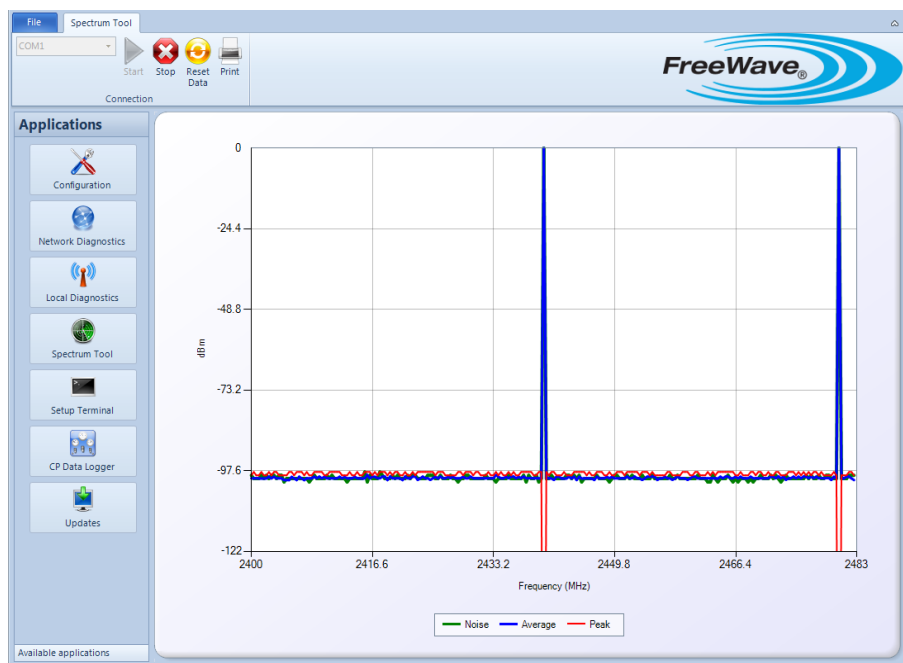
**Note:** To run an analysis for a device, the device must be taken offline.

**To run a spectrum analysis:**

1. Click **Spectrum Tool** in the Applications pane to display the Spectrum Tool application.
2. Connect the device and click **Start** in the Spectrum Tool ribbon.
3. Click **Yes** at the prompt to place the device offline and run the analysis or click **No** to exit without taking the device offline and running the analysis.



Tool Suite runs the analysis and updates the graph as it receives data from the device:



4. Click **Reset Data** in the Spectrum Tool ribbon to reset the peak and average trend lines in the graph.

**To stop a spectrum analysis:**

1. Click **Spectrum Tool** in the Applications pane to display the Spectrum Tool application.
2. Click **Stop** in the Spectrum Tool ribbon.

**Printing a Spectrum Analysis Graph**

In Tool Suite version 2.4.0 and above, you can print the current view of the spectrum analysis graph.

1. Click **Spectrum Tool** in the Applications pane to display the Spectrum Tool application.
2. Click **Print** in the ribbon to display a print preview of the graph.
3. To print the graph, click the **Printer** icon in the upper left corner of the print preview window.

The document is sent to the default printer defined on your computer.





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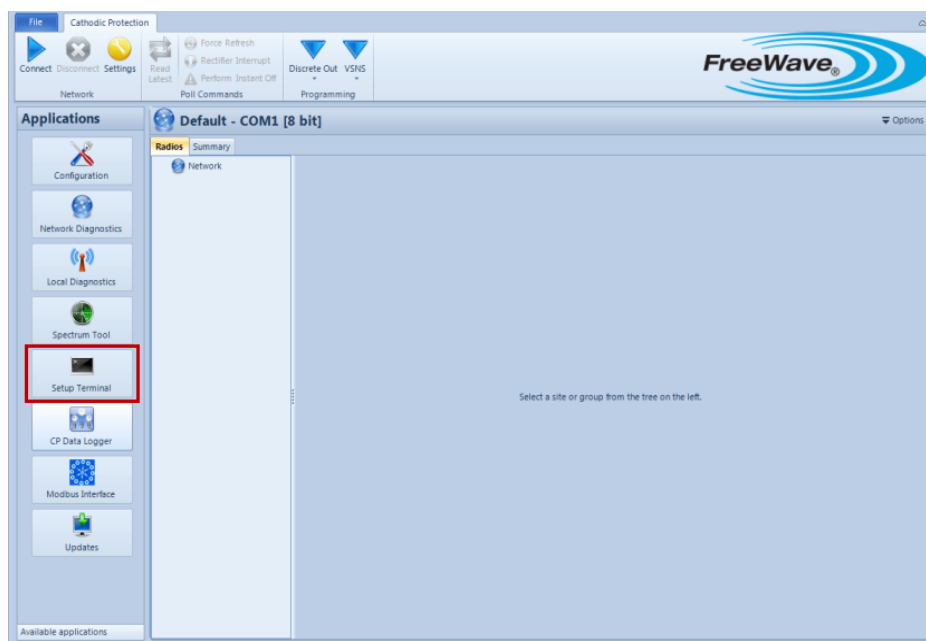
## Chapter 7: Setup Terminal Application

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Use the Setup Terminal application to configure a device using a terminal window that mirrors the menu structure of HyperTerminal. You can use the Setup Terminal instead of the Configuration application to program devices in your network.

**Note:** I/O Expansion Serial Base and Expansion modules are not compatible with either HyperTerminal or the Tool Suite Setup Terminal application. Configure these devices using the parameters in the Configuration application. See "I/O Serial Base and Expansion Module Device Parameter Tabs" on page 31.

Click **Setup Terminal** in the Applications pane to get started.



## Configuring Devices Using Setup Terminal

Use the Setup Terminal application to configure a device using a terminal window that mirrors the menu structure of HyperTerminal.

**Note:** All changes made through Setup Terminal are sent to the device immediately.

Be sure to disconnect the device after making any changes before running diagnostics for the device.

1. Click **Setup Terminal** in the Applications pane to display the Setup Terminal application.
2. Ensure the device you want to configure is connected to your computer and that all diagnostics are stopped.
3. Select the Com Port to which the device is connected from the drop-down list in the Setup Terminal ribbon and click **Connect**.

The setup menu for the device displays in the Setup Terminal window:



4. Type the number of the menu you want to expand and make updates as necessary.
5. Press **Esc** to exit the menu or click **Disconnect** in the Setup Terminal ribbon to disconnect the device.

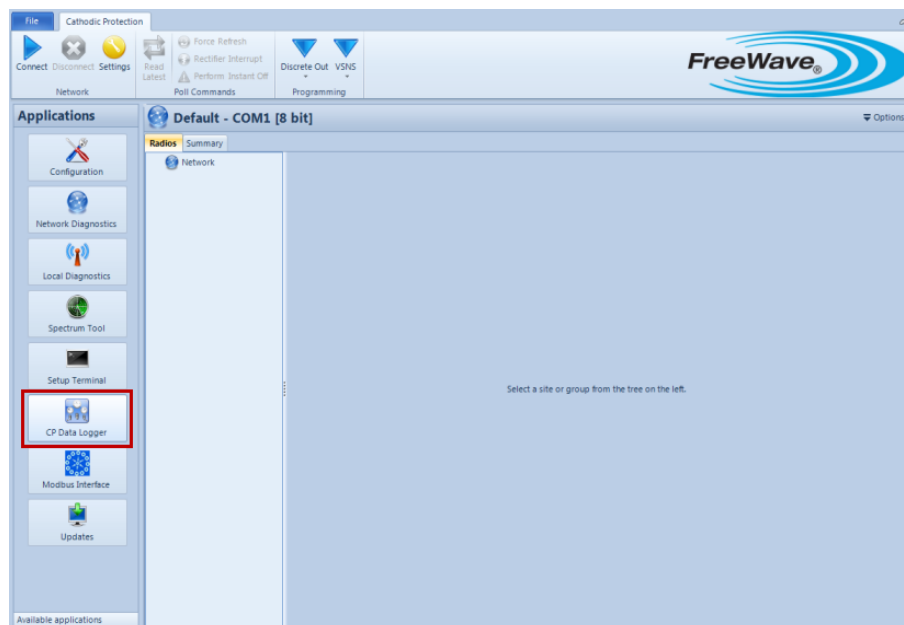
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## Chapter 8: CP Data Logger Application

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The CP Data Logger is an application that provides basic polling and reporting functions for FreeWave Cathodic Protection Remote Monitoring Units.

Click **CP Data Logger** in the Applications pane to get started.



### Configuring CP Data Logger Network Settings

The first time you open the CP Data Logger application, you need to configure the settings for your Cathodic Protection network. You can edit these settings later, if needed.

1. Click **CP Data Logger** in the Applications pane to display the CP Data Logger application.
2. Click **Settings** in the Cathodic Protection ribbon to display the Network Settings window.
3. Click the **Network** tab and complete the following information:

Field	Description
<b>Name</b>	The name of the network to poll. Default displays as the name until you change it.
<b>Type</b>	Select the network type, Serial or TCP/IP. Complete the additional settings in the last tab in the window.
<b>High Impedance</b>	If the connected CP unit is a 2.4 GHz Sand High Impedance device, select this check box.
<b>Notes</b>	<i>(Optional)</i> Enter any notes up to 100 characters regarding the network.

4. Click the **Modbus** tab and complete the following information regarding the Modbus settings for the network:

Field	Description
<b>Address Length</b>	Select the length of the Modbus address. The address length must match the address length selected in the FGR-CP and GX-CP devices.
<b>Poll Timeout</b>	Enter the number of milliseconds between 100 and 5000, the Master waits for a response from a poll.  The default and recommended value is 3000 (3000 = 3 seconds). The higher the number, the longer the Master waits before timing out (for example 5000 = 5 seconds).
<b>Interval Timeout</b>	Enter the number of milliseconds between 50 and 300 the Master waits between polling each site.
<b>Instant Off Repeats</b>	Enter the number of times between 1 and 24 the Rectifier Interrupt cycle is repeated.
<b>Relay ON Delay</b>	Enter the number of seconds between 1 and 60 the relay is turned on (disabling the rectifier).
<b>Relay OFF Delay</b>	Enter the number of seconds between 1 and 60 the relay is turned off (enabling the rectifier).
<b>Charge Delay</b>	Enter the number of seconds between 1 and 200 to wait for the measurement capacitors to charge.

5. If you are defining a serial network, click the **Serial** tab and complete the following information:

Field	Description
<b>Port</b>	Indicate which port on the computer is connected to the device. For example, COM1.

Field	Description
<b>Baud Rate</b>	Select the communication rate between the computer and the device data port. The default <b>Baud Rate</b> is <b>19200</b> .
<b>Parity</b>	Select the data parity of the network. The default <b>Parity</b> is <b>None</b> .
<b>Flow Control (RTS/CTS)</b>	Select this check box if the port uses standard RTS/CTS control lines. The <b>Flow Control</b> check box is typically not selected.

---

**Important:** The **Baud Rate**, **Parity**, and **Flow Control** *must* match the Master's settings.

---

If you are defining a TCP/IP network, click the **TCP** tab and complete the following information:

Field	Description
<b>Terminal Address</b>	Enter the IP address of the terminal server through which you connect to devices.
<b>Terminal Port</b>	Enter the port number to which the serial Master is connected.

- Click **OK** to save the changes and close the Network Settings window, or click **Cancel** to exit without saving changes.


## Adding and Removing Cathodic Protection Sites

To add a Cathodic Protection (CP) device to your network, add a site. You can then group sites together that have the same polling intervals and start times. For more information, see "Adding and Removing Cathodic Protection Polling Groups" on page 77.

### To add and configure a CP site:

- Click **CP Data Logger** in the Applications pane to display the CP Data Logger application.
- From the **Options** drop-down menu in the Network Title ribbon select **Add Site**.  
The device is added to the Radios tree.
- Click the Configuration tab at the bottom of the Data Logger window and set the following information for the device:

Field	Description
<b>Name</b>	Enter a name that identifies the CP device.  New Site displays as the site name in the tree view until you change the name in this field.

Field	Description
<b>Coordinates</b>	Enter the global positioning system (GPS) coordinates of the device. You can also enter notes in this field about the device's location.
<b>Shunt Resistance</b>	Enter the value of the shunt resistor.
<b>Modbus ID</b>	Enter the same Modbus ID of the device.
<b>Poll Interval and Poll Start</b>	<p>Select how often the Data Logger collects data from the site and enter the start time in the <b>Poll Start</b> field. If the site is part of a group, the site uses the polling interval and start time defined for the group.</p> <ul style="list-style-type: none"> <li>• <b>Hourly</b> - Select to poll every hour. Set to start on minute 1 (:01) up to minute 59 (:59) of every hour.</li> <li>• <b>Daily</b> - Select to poll once a day. Enter which hour to start polling each day. Polling can be set to start on any hour from 1:00 AM to 11:00 PM.</li> <li>• <b>Weekly</b> - Select to poll once a week. Set the initial day and date the poller starts on the displayed calendar. The poller continues to poll each week on the specified day at midnight (12:00 am).</li> <li>• <b>Monthly</b> - Select to poll once a month. Set the initial day and date the poller begins for the month. The poller continues to poll each month on the specified date (for example, the 5<sup>th</sup> of each month) at midnight (12:00 am).</li> </ul> <p>The interval you select displays under Polling in the group name in the tree view. For example, the following site is set to poll hourly:</p> <div data-bbox="566 1234 800 1341">  <p><b>New Site</b> Address: 3 Polling: Hourly</p> </div>
<b>Enable Discrete Output Programming</b>	<p>Select this check box to activate the <b>Discrete Out</b> button in the Programming section of the Cathodic Protection ribbon.</p> <p>For more information, see "Disconnecting the Cathodic Protection Rectifier from the Pipe " on page 83.</p>
<b>Enable VSNS Programming</b>	<p>Select this check box to activate the <b>VSNS</b> button in the Programming section of the <b>Cathodic Protection</b> ribbon.</p> <p>For more information, see "Controlling Analog Sensor Power on a Cathodic Protection Device " on page 83.</p>

4. Click the icon in the **Active** field to activate or inactivate polling for all sites within the group.

- Active: 

- Inactive: 

You can also right-click the group in the Radios tree and select the appropriate action.

**Note:** Activating or inactivating a single site within a group only inactivates that specific site.

5. In the Alarms table, enter the lower and upper limits that you want to be warned about during polling. All alarms, or specific alarm settings within the table can be left blank. The table below lists the recommended alarm values for each parameter:

Field	Description
<b>Analog Input</b>	Measured in VDC. <b>Low Limit:</b> At or below 0 <b>High limit:</b> At or above 6
<b>Rectifier Shunt Voltage</b>	Measured in mVDC <b>Low Limit:</b> At or below -1.6 <b>High Limit:</b> At or above 1.6
<b>Rectifier Voltage</b>	Measured in mVDC. Set both low and high limits to an impossible range.
<b>Pipe to Soil</b>	Measured in mVDC. <b>Low Limit:</b> At or below -1.6 <b>High Limit:</b> At or above 1.6
<b>Battery Voltage</b>	Measured in VDC. <b>Low Limit:</b> At or below 5 <b>High Limit:</b> At or above 31
<b>Temperature</b>	Measured in °C. <b>Low Limit:</b> At or below -36 <b>High Limit:</b> At or above 76

#### To remove a CP site:

1. Click **CP Data Logger** in the Applications pane to display the CP Data Logger application.
2. In the Radio tree, right-click the device you want to delete and select **Delete**.  
Tool Suite deletes the device and its polling data .


## Adding and Removing Cathodic Protection Polling Groups

Use groups in the CP Data Logger to group devices together into sites that share the same polling interval.

#### To add a group to a CP network:

1. Click **CP Data Logger** in the Applications pane to display the CP Data Logger application.
2. From the **Options** drop-down menu in the Network Title ribbon select **Add Group**.

3. Complete the following information about the group:

Field	Description
<b>Name</b>	Enter a name for the group that identifies its purpose. New Group displays as the Group name in the tree view, until you rename the group.
<b>Description</b>	<i>(Optional)</i> Enter any notes up to 100 characters regarding the group of CP devices.
<b>Poll Interval and Poll Start</b>	<p>Select how often the Data Logger collects data from the sites in the group and enter the start time in the <b>Poll Start</b> field.</p> <ul style="list-style-type: none"> <li>• <b>Hourly</b> - Select to poll every hour. Set to start on minute 1 (:01) up to minute 59 (:59) of every hour.</li> <li>• <b>Daily</b> - Select to poll once a day. Enter which hour to start polling each day. Polling can be set to start on any hour from 1:00 AM to 11:00 PM.</li> <li>• <b>Weekly</b> - Select to poll once a week. Set the initial day and date the poller starts on the displayed calendar. The poller continues to poll each week on the specified day at midnight (12:00 am).</li> <li>• <b>Monthly</b> - Select to poll once a month. Set the initial day and date the poller begins for the month. The poller continues to poll each month on the specified date (for example, the 5<sup>th</sup> of each month) at midnight (12:00 am).</li> </ul> <p>The interval you select displays under Polling in the group name in the tree view. For example, the following site is set to poll hourly:</p> <div data-bbox="602 1182 833 1287">  <p><b>New Site</b> Address: 3 Polling: Hourly</p> </div>

4. Click the icon in the **Active** field to activate or inactivate polling for all sites within the group.

• Active - 

• Inactive - 

You can also right-click the group in the Radios tree and select the appropriate action.

#### To remove a CP group:

1. Click **CP Data Logger** in the Applications pane to display the CP Data Logger application.
2. In the Radio tree, right-click the group you want to delete and select **Delete**.

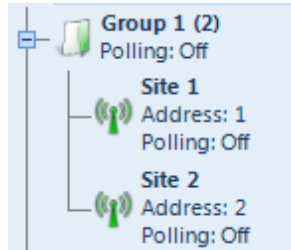
Tool Suite deletes the group and all the devices within that group.



**To add a site to a group:**

1. Click **CP Data Logger** in the Applications pane to display the CP Data Logger application.
2. In the Radios tree, select the radio you want to move and drag and drop it on top of the group icon to which you want to add the device.

The device displays nested under the group.



## Gathering Data from Cathodic Protection Sites

After you have configured a CP site, you can poll that site for data. If Tool Suite is connected to the site and you have defined a recurring interval in the **Polling Interval** and **Polling Start** fields for the site, Tool Suite polls the site at that interval for data.

1. Click **CP Data Logger** in the Applications pane to display the CP Data Logger application.
2. In the Radios tree, select the site or group you want to poll and click **Connect** in the Network section of the Cathodic Protection ribbon.
3. If a graph does not display in the CP Data Logger window when you connect, click **Read Latest** to populate the window with the view of a graph.

Click **Read Latest** again to populate the graph with the polled data.

**Note:** The status of the polling command is displayed at the bottom of the window.

4. As you are polling data from a site, you can also do the following using the options in the Poll Command section of the ribbon.
  - To force the radio to cycle relays, click **Force Refresh** to refresh the measurements of the charging capacitors.
  - To cycle the rectifier one time, click **Rectifier Interrupt** to turn off the rectifier and go through one On, Off, Charge relay cycle.
  - To cycle the rectifier multiple times, click **Perform Instant Off** to cycle the rectifier through the number of On, Off, and Charge relay cycles defined in the **Rectifier Interrupt** field in the CP network settings.

## Viewing Cathodic Protection Polled Data

Tool Suite offers multiple ways to review the data returned when it polls a Cathodic Protection (CP) device.

- **Graph view** - Displays all the current data from the device in chart.
- **Summary view** - Provides the most recent polls and provides an overview of all the sites and groups within the network on a single page in a table format.

- **History view** - Displays at-a-glance a history of the parameters polled from a device and when the data was gathered.

## Using the Cathodic Protection Graph View

You can view the data from a Cathodic Protection (CP) device in graph form. Tool Suite charts all the current data for the device on a single graph. You can zoom in and out on different parts of the graph for greater magnification.



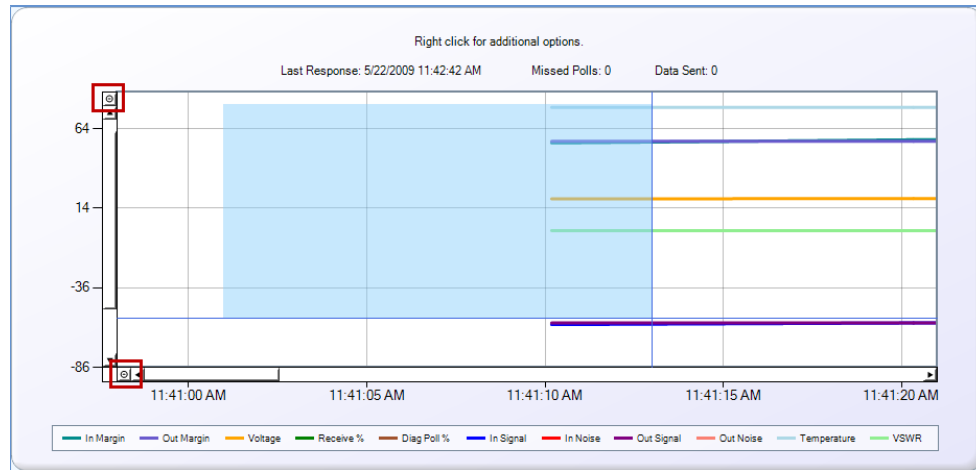
### To display the graph view:

1. Click **CP Data Logger** in the Applications pane to display the CP Data Logger application.
2. From the Radio tree, select the device you want to review.
3. Click the **Poll Data** tab at the bottom of the CP Data Logger window.

### To zoom in and out in the graph:

1. With the graph displayed, hold down the left button on the mouse at the uppermost or lowest point of the area on the graph in which you want to zoom.
2. Drag the mouse across the entire area on which you want to zoom.

To zoom out, click the **O** in either the top upper left corner (controls zooming out at the Y-axis) and/or the lower left corner (controls zooming out at the X-axis) of the graph.



**Note:** The number of times the graph was magnified equals the number of times you need to click either one of the reset points to return the graph to the normal view.

## Using the Cathodic Protection Summary View

The Summary view displays the most recent polls and provides an overview of all the sites and groups within the network on a single page.

FreeWave - COM1 [8 bit] Options

Radio 

Summary

Name	Modbus Address	Coordinates	Group	Last Poll Date	Rectifier Voltage (mVDC)	AI1 (VDC)	AI2 (VDC)	Battery Voltage (VDC)	Rectifier Current (mA)	Pipe - Soil Voltage (mVDC)	Temp (°C)	DI1	DI2	DO	VSNS	Rectifier Input Power Status
PW 2.4GHz CP	1	Not Set	No Group	3/23/2018 3:49:52 ...	399.99	0.01	4.9999...	12.24	0.89	-6.573.07	29.00	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
New Site	2	Not Set	No Group		NaN	NaN	NaN	NaN		NaN	NaN	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Note:** If the **Rectifier Input Status** is on in the site, then the **Rectifier Input Power Status** check box is checked in the Summary View. You cannot change the setting from this view.

### To display the Summary view:

1. Click **CP Data Logger** in the Applications pane to display the CP Data Logger application.
2. From the Radio tree, select the device you want to review and click the Summary tab.

### To print or save summary data:

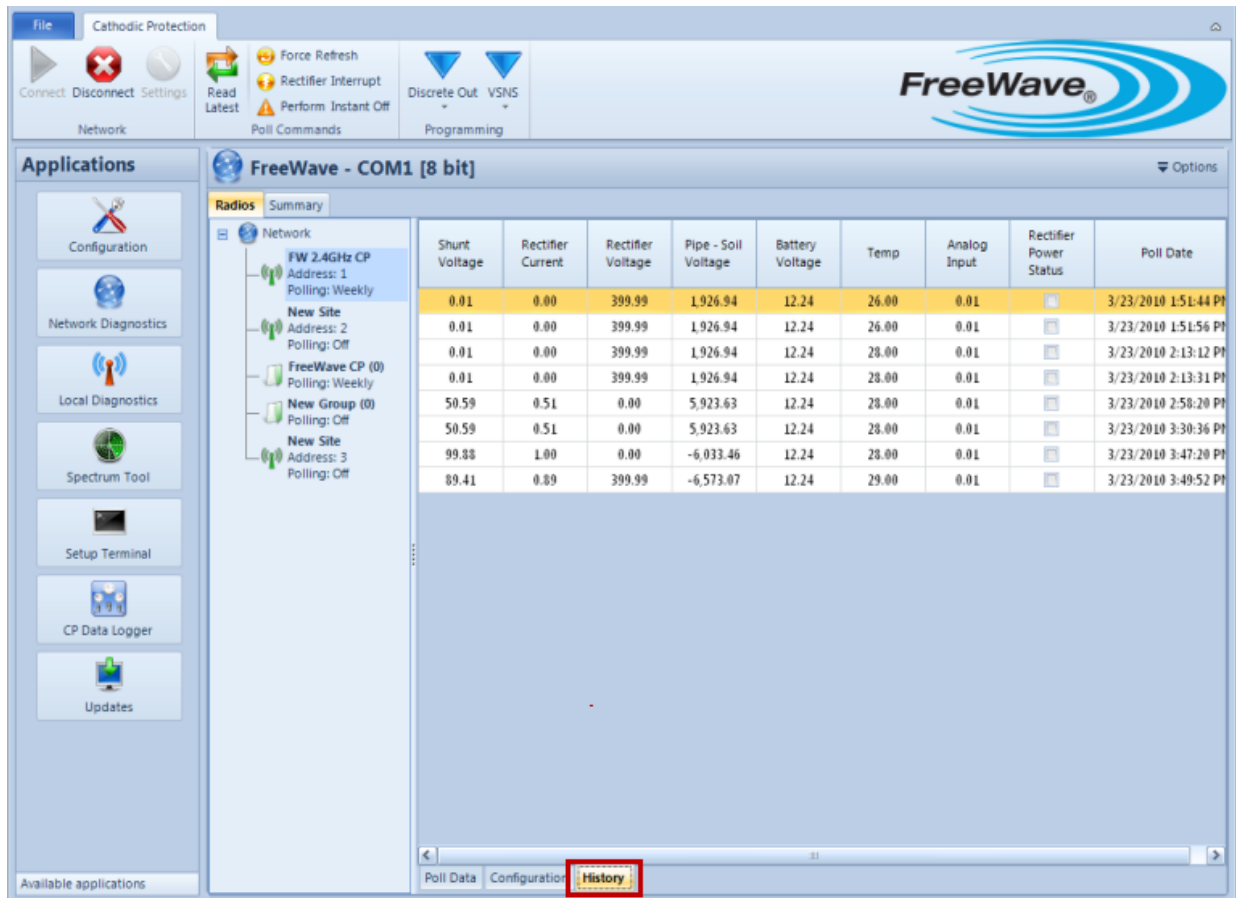
1. Click **CP Data Logger** in the Applications pane to display the CP Data Logger application.
2. From the Radio tree view, right-click the device you want to review and select **View Report**.
3. In the fields provided, enter the date range you want to print or save data and click **Report** , or click **Cancel** to exit without creating a report.

To create a report with the most recent data, select the date on which the last poll was completed.

The report displays in a separate window. Use the icons across the top of the report window to print and save as PDF or an Excel file.

## Using the Cathodic Protection History View

The History view displays at-a-glance a history of the parameters polled from a device and when the data was gathered. The History tab refreshes each time the device is polled. You can view the history data within Tool Suite and send the history to a report, from which you can print or save for viewing in Microsoft Excel or as a PDF.



### To display the History view:

1. Click **CP Data Logger** in the Applications pane to display the CP Data Logger application.
2. From the Radio tree, select the device you want to review.
3. Click the **History** tab at the bottom of the CP Data Logger window.

### To print or save history data:

1. Click **CP Data Logger** in the Applications pane to display the CP Data Logger application.
2. From the Radio tree, right-click the device you want to review and select **View Report**.
3. Enter the Date Range for which you want to print or save history data and click **Report**, or click **Cancel** to exit without creating a report.

The report displays in a separate window. Use the icons across the top of the report window to print and save as PDF or an Excel file.

## Disconnecting the Cathodic Protection Rectifier from the Pipe

On FGR2-CP devices, you have further control of the Interrupter Relay Driver. For more detailed information about programming the Discrete Output, see to the *Cathodic Protection Manual Addendum* available on the FreeWave Web site and the *User Manuals and Utilities* CD.

**Note:** You can only control the Relay Digital Output on sites that have the **Enable Discrete Output Programming** check box selected in the site's Configuration tab.

1. Click **CP Data Logger** in the Applications pane to display the CP Data Logger application.
2. In the Radios tree, select the site you want to control.
3. Click **Discrete Out** in the Programming section of the Cathodic Protection ribbon and select **On** to disconnect the rectifier from the pipe.

## Controlling Analog Sensor Power on a Cathodic Protection Device

You have further control of the power to the analog sensor on a Cathodic Protection (CP) device. For more detailed information about programming the Sensor Power, see the *Cathodic Protection Manual Addendum* available on the FreeWave Web site and the *User Manuals and Utilities* CD.

**Note:** You can only control the analog sensor power on sites that have the **Enable VSNS Programming** check box selected in the site's Configuration tab.

1. Click **CP Data Logger** in the Applications pane to display the CP Data Logger application.
2. In the Radios tree , select the site you want to control.
3. Click **VSNS** in the Programming section of the Cathodic Protection ribbon and select **On** to enable the sensor power.



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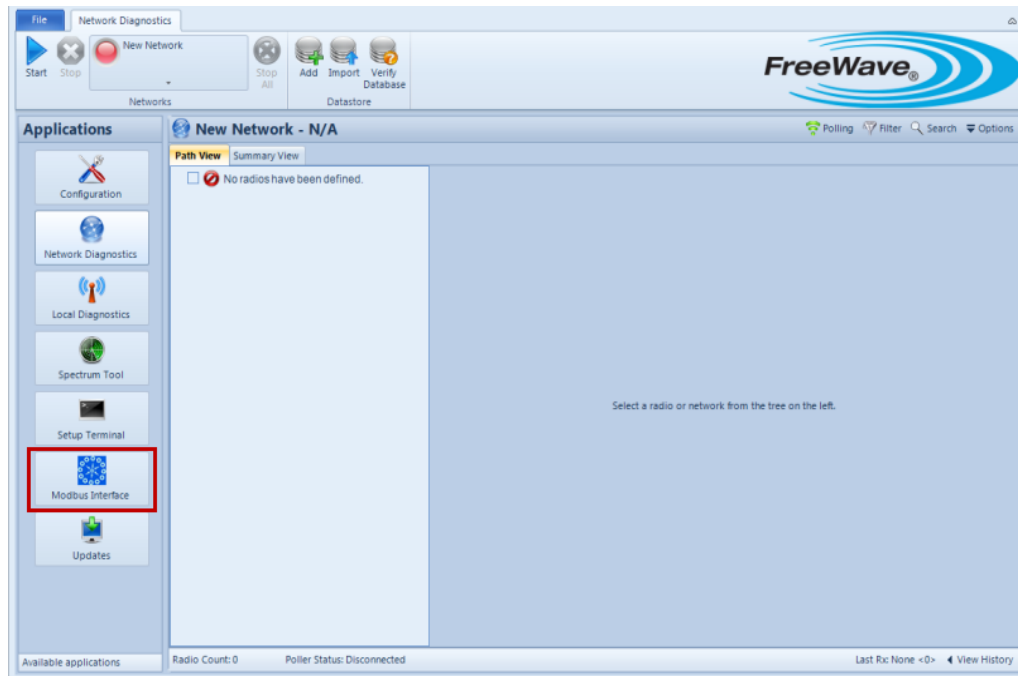
## Chapter 9: Modbus Interface Application

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Use the Modbus Interface application to validate and troubleshoot the Modbus configuration for a device that uses the Modbus protocol. Using the Modbus Interface application can help you to determine if a problem you are experiencing is a hardware issue, a software issue, or an issue with a device to which a FreeWave device is connected. From the Modbus Interface application you can do the following:

- Use pre-entered register maps for all FreeWave I/O products.
- Poll and monitor devices using the Dashboard, Summary view, or using a graphical chart.
- Import and export register maps.
- Edit and add register maps of your own.

Click **Modbus Interface** in the Applications pane to get started.



## About Monitoring Modbus Devices

Using the Modbus Interface application, you can validate and troubleshoot specific registers to ensure a device running the Modbus protocol is functioning correctly. For information about selecting the registers you want to monitor from your devices, see "Selecting Registers to Monitor" on page 88.

The application offers the following views into a device's register data.

- **Dashboard** - The Dashboard displays in the Modbus Interface main window and contains the Modbus ID, device name, register name, current register value, and the last updated information for the registers that you selected to monitor. For more information, see "Using the Modbus Interface Dashboard" on page 89.
- **Summary View** - The Summary view provides a high-level view of the registers you select to monitor. For more information, see "Using the Modbus Interface Summary View" on page 90.
- **Chart View** - The Chart view provides a graphic representation of the register's you select to monitor. For more information, see "Using the Modbus Interface Chart View" on page 91.

## Configuring Modbus Network Settings

To connect Tool Suite to a Modbus device for monitoring, you must first define the characteristics of your network.

1. Click **Modbus Interface** in the Applications pane to display the Modbus Interface application.
2. Click **Settings** in the Modbus Interface ribbon to display the Network Settings window.
3. Click the Network tab and provide the following identification information for the network:
  - In the **Name** field, enter a name that identifies the network.
  - In the **Type** field, select what type of network you are defining, **Serial** or **TCP**.



4. In the Modbus tab, provide the following information about how often Tool Suite polls the devices in the network for data:

Field	Description
<b>Poll Timeout</b>	Enter the number of milliseconds that Tool Suite waits to receive a response from a device before moving to the next device.
<b>Interval Timeout</b>	Enter the number of milliseconds that Tool Suite waits to receive a response from all devices prior to timing out.
<b>Poll Interval</b>	Enter the number of milliseconds that Tool Suite waits between each polling cycle. This determines how often the devices are polled.

5. If you are configuring a serial network, in the Serial tab provide the following information about the serial port on the computer that is connected to the network you want to monitor:

Field	Description
<b>Port</b>	Indicate which port on the computer is connected to the device. For example, COM1.
<b>Baud Rate</b>	Select the communication rate between the computer and the device data port. The default <b>Baud Rate</b> is <b>19200</b> .
<b>Parity</b>	Select the data parity of the network. The default <b>Parity</b> is <b>None</b> .
<b>Flow Control (RTS/CTS)</b>	Select this check box if the port uses standard RTS/CTS control lines. The <b>Flow Control</b> check box is typically not selected.

If you are configuring a TCP network, in the TCP tab provide the following information about connecting to the device:

Field	Description
<b>Terminal Address</b>	Enter the IP address of the terminal server through which you connect to devices.
<b>Terminal Port</b>	Enter the port number of the terminal server through which you connect to devices.

6. Click **OK** to save the network setting and return to the main Modbus Interface application window.

## Adding and Removing Devices from Modbus Networks

Adding and removing devices from the Modbus network works similarly to adding devices to a network in the Configuration application.

**To add a device to a Modbus network:**

1. Click **Modbus Interface** in the Applications pane to display the Modbus Interface application.
2. Right-click in the Devices tab and select **Add Device** to display the New Device window.
3. Complete the following information for the device you are adding:

Field	Description
<b>Name</b>	A name that helps to identify the device.
<b>Register Map</b>	The set of registers that Tool Suite can read from the device. FreeWave provides register maps for the FreeWave devices that run the Modbus protocol. You can also define your own register maps and assign them to the device. For more information, see "About Register Maps" on page 91.
<b>Address Length</b>	Indicates if the Modbus address is 8 bits or 16 bits long, which also determines the range of acceptable IDs. When reading FreeWave radios, this value must match the <b>Modbus Address Size</b> option of the radio.
<b>Modbus ID</b>	The Modbus identification number for the device. If the <b>Address Length</b> is 8 bit, the Modbus ID can be between 1 and 246. If the <b>Address Length</b> is 16 bit, the ID can be between 1 and 65535.  If you are unsure what the Modbus ID is for a device, connect to the device through the Configuration application to look up the Modbus ID assigned to the device.

4. Click **Add** to add the device to the network, or click **Cancel** to exit without adding the device.

**To remove a device from a Modbus network:**

1. Click **Modbus Interface** in the Applications pane to display the Modbus Interface application.
2. In the Default network portion of the window, click the Devices tab.
3. In the Device tab, right-click the device you want to remove and select **Delete**.
4. Click **Yes** at the prompt to delete the device, or click **No** to return to the Device tree without deleting the device.

**Selecting Registers to Monitor**

A register map for a device can contain hundreds of registers. Out of all the registers in a device's register map, you might only be interested in a subset. You can add the individual registers you are interested in monitoring to the Modbus Interface Dashboard for polling and monitoring.

1. Click **Modbus Interface** in the Applications pane to display the Modbus Interface application.
2. In the Devices tab, click the device that you want to monitor to display its assigned register map.

3. In the Registers table for the device, locate the register you want to monitor and click **Add** in the far right column of the register line.
4. Repeat steps 2 and 3 for additional registers you want to monitor.

The register is added to the Dashboard at the bottom of the window. In addition, the register is also added to the Summary view and the Chart view.

## Connecting Modbus Devices for Monitoring

After you have defined your network settings, you can connect to a Modbus device and begin monitoring the registers.

1. Click **Modbus Interface** in the Applications pane to display the Modbus Interface application.
2. Ensure that the device is connected to power, that the device is connected to the correct port on your computer, and that the network settings are correctly defined.
3. Click **Connect** in the Modbus Interface ribbon.

The registers you selected to gather are collected and display automatically in the Dashboard, Summary view, and Chart view. You can work in other parts of Tool Suite and the collection process continues at the specified polling interval. However, you can only complete Tool Suite tasks that do not require the port to which the device that you are polling is connected.

## Changing Register Settings on Devices

As you are troubleshooting devices, you can change the setting for a register that you are monitoring without changing the register map. In doing so, you can determine if the device sends back the data you expect during the next polling interval.

**Note:** You can only change values for registers that you have created. You cannot modify the values of the registers in maps that FreeWave provides.

1. Click **Modbus Interface** in the Applications pane to display the Modbus Interface application.
2. Ensure the registers you want to monitor are listed in the Dashboard at the bottom of the window. See "Selecting Registers to Monitor" on page 88.
3. Connect the device you want to monitor, ensure the network settings are correct, and click **Connect** in the Modbus Interface ribbon to begin polling the device.

As Tool Suite polls and receives information about the registers, the values returned are listed in the **Value** field.

4. To change a value and send it to the device during the next polling cycle, right-click in the **Value** field of the register you want to change and select **Change**.
5. In the **New Value** field, enter the value to send to the device and click **OK**.
6. The next time Tool Suite communicates with the device, it sends the new value.

## Using the Modbus Interface Dashboard

The Dashboard displays in the Modbus Interface main window and contains the Modbus ID, device name, register name, current register value, and the last updated information for the register.

Dashboard					
	ModbusID	DeviceName	RegisterName	Value	LastUpdate
▶	1	FGR2-IOS-C	All MSW		
	1	FGR2-IOS-C	Device Temperature Normalized Result	C	
	1	FGR2-IOS-C	Device Temperature	C	

To add registers to monitor to the dashboard, see "Selecting Registers to Monitor" on page 88.

The Dashboard displays at the bottom of the Modbus Interface main window. However, if you click in the Dashboard title bar and drag your mouse, you can "float" the dashboard anywhere on your screen. To re-dock it to the bottom of the application, click the title bar and drag your mouse cursor (while holding the title bar) to the bottom arrow that displays.



You can also dock the dashboard to the right, left, or top of the Tool Suite window.

### Using the Modbus Interface Summary View

The Summary view provides a high-level view of the registers you select to monitor. This view contains the device name, register map assigned to the device, Modbus ID, register name, last value received from the device, and the last time the device was polled. If Missed displays in the **Value** field, Tool Suite was unable to gather the information for the register the last time it polled the device.

Devices Summary Chart					
Name	Register Map	Modbus ID	Register	Value	Last Polled
New Device	Reg Map Test 2	1	New Register	Missed	
New Device	Reg Map Test 2	1	New Register 2	Missed	

1. Click **Modbus Interface** in the Applications pane to display the Modbus Interface application.
2. Ensure that Tool Suite is connect to and monitoring a device.
3. In the Device tree, select the device you want to review and click the **Summary** tab.

## Using the Modbus Interface Chart View

You can view the data from Modbus polling in graph form. Tool Suite charts all the current data for the device on a single graph. You can zoom in and out on different parts of the graph for greater magnification. The graph contains the following data across the top of the graph.

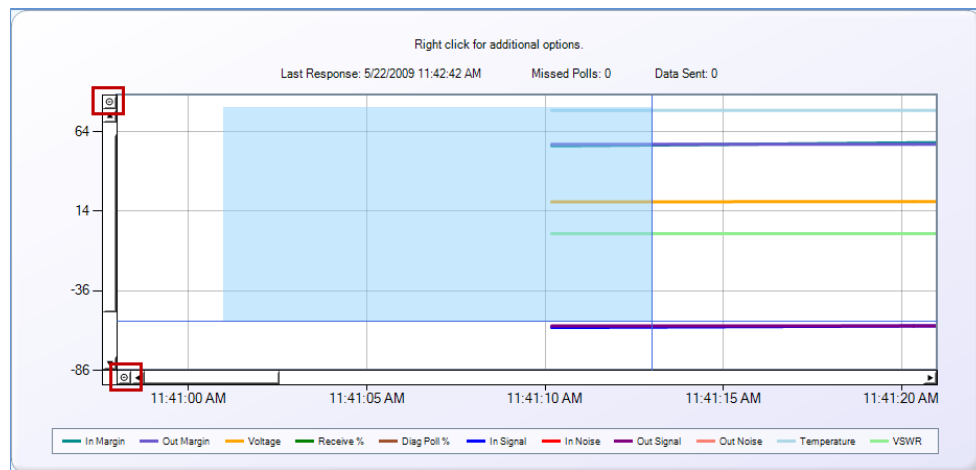
### To display the graph view:

1. Click **Modbus Interface** in the Applications pane to display the Modbus Interface application.
2. In the Device tree, select the device you want to review.
3. Click the **Chart** tab to display the graph.

### To zoom in and out in the graph:

1. With the graph displayed, hold down the left button on the mouse at the uppermost or lowest point of the area on the graph in which you want to zoom.
2. Drag the mouse across the entire area on which you want to zoom.

To zoom out, click the **O** in either the top upper left corner (controls zooming out at the Y-axis) and/or the lower left corner (controls zooming out at the X-axis) of the graph.



**Note:** The number of times the graph was magnified equals the number of times you need to click either one of the reset points to return the graph to the normal view.

## About Register Maps

A register map includes all the points of data that you can read from a device. When you add a device to a network, you assign it a register map so Tool Suite knows what data is available on the device and where the data is stored in that device's memory.


FreeWave provides register maps in the Modbus Interface application for the FreeWave devices that use the Modbus protocol. You can also do the following:

- Export a register map for use in Tool Suite on a different computer.
- Export a FreeWave register map and import it to create a unique version of the map. You cannot edit the maps that FreeWave provides, however, you can edit an imported map and assign the edited map to a device. Exporting a FreeWave map and editing the imported version is the most efficient way to create a map based on an existing map that only has a few changes.
- Create a register map for third party devices that you are monitoring using Tool Suite. Typically, you have a Modbus register map for the device that you can use to enter the map into Tool Suite.

## Adding and Removing Modbus Register Maps

You can add your own Modbus register maps to assign to devices. For example, if you have a third-party device that uses the Modbus protocol, you can use the Modbus Interface application within FreeWave Tool Suite to monitor it as you monitor other devices.

### To add a Modbus register map:


1. Click **Modbus Interface** in the Applications pane to display the Modbus Interface application.
2. Click **Edit** in the Modbus Interface ribbon to display the Edit Register Maps window.
3. Click the **Plus** icon  in the toolbar to display a blank register map.
4. In the **Name** field, enter a name that identifies the purpose of the Modbus register you are creating.
5. Select the **PLC Addressing** check box if the register map you are entering uses PLC addresses, that is, the address locations in the map start at 1 instead of 0.
6. In the Register Map table, complete one row per register you want to create:

Field	Description
<b>Name</b>	Enter the register name.
<b>Unit</b>	Enter the unit of measure, such as mV or mA. If a unit of measure is not applicable, accept the default N/A value.
<b>Modbus Type</b>	Select from the following Modbus types: <ul style="list-style-type: none"> <li>• <b>Coil</b> - Select this option if the register is a single bit.</li> <li>• <b>Input Register</b> - Select this option if the register is a read-only value.</li> <li>• <b>Holding Register</b> - Select this option if the register is a read/write value.</li> </ul>
<b>Value Type</b>	Select from one of the following values: <ul style="list-style-type: none"> <li>• 16-bit signed integer</li> <li>• 16-bit unsigned integer</li> <li>• 32-bit floating point (use this option for values that contain decimals)</li> <li>• 32-bit signed integer</li> <li>• 32-bit unsigned integer</li> <li>• Single bit</li> </ul>

Field	Description
<b>Address</b>	Enter the Register address of the value. For example, 40003.
<b>Scale</b>	If you want to display the value in a different unit than is returned from the device, enter the scale here. For example, if the device returns mV but you prefer to view the value in V, enter 0.001 in the <b>Scale</b> field.

- Click **Close** to save the register map and return to the main Modbus Interface application window.

#### To remove a register map:

- Click **Modbus Interface** in the Applications pane to display the Modbus Interface application.
- Click **Edit** in the Modbus Interface ribbon to display the Edit Register Maps window.
- Using the arrows in the toolbar, scroll through the register maps until you locate the map you want to delete.  
  
The register map name displays in the **Name** field. Names of the register maps that FreeWave provides display in gray text. Register maps that you created or imported are listed at the end and are displayed in black text.
- With the correct register map displayed, click the **red x** icon  in the toolbar and answer **Yes** at the prompt to delete the register map.

#### Editing Modbus Register Maps


You can edit the settings or add register items to a map that you created in the Modbus Interface application. You cannot edit the registers that FreeWave provides. However, you can export a FreeWave register map and import it with a different name to make a unique version of the register map

- Click **Modbus Interface** in the Applications pane to display the Modbus Interface application.
- Click **Edit** in the Modbus Interface ribbon to display the Edit Register Maps window.
- Using the arrows in the toolbar, scroll through the register maps until you locate the map you want to edit.  
  
The register map name displays in the **Name** field. Names of the register maps that FreeWave provides display in gray text. Register maps that you created or imported are listed at the end and display in black text.
- With the correct register map displayed, add register items or update items as necessary. For more information, see "Adding and Removing Modbus Register Maps" on page 92.
- Click **Close** to save the register map and return to the main Modbus Interface application window.

#### Exporting and Importing Modbus Register Maps

You can export the contents of a register map and import it back into your current instance of Tool Suite or Tool Suite that runs on another computer. You might export and import register maps that you have created, or export a map that FreeWave has provided, and import it in under a different name so you can edit the settings.

**To export a Modbus register map:**

1. Click **Modbus Interface** in the Applications pane to display the Modbus Interface application.
2. Click **Edit** in the Modbus Interface ribbon to display the Edit Register Maps window.
3. Using the arrows in the toolbar, scroll through the register maps until you locate the map you want to export.
4. With the correct map displayed, click the **Export** icon  in the toolbar to display.
5. In the Export To window, select the directory in which you want to save the file.
6. In the **File Name** field, enter a file name that helps to identify the purpose of the register map.  
All register maps exported from the Modbus Interface are saved with a .mx extension.
7. Click **Save** to export and save the file.

**To import a Modbus register map:**

1. Click **Modbus Interface** in the Applications pane to display the Modbus Interface application.
2. Click **Import** in the Modbus Interface ribbon.
3. In the Import Register Map window, locate the file with a .mx extension that you want to import.
4. Click **Open** to import the register map file into the Modbus Interface application.  
The register map is now available for selection in the **Register Map** field when you add a device to your network.



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## Chapter 10: Updates Application

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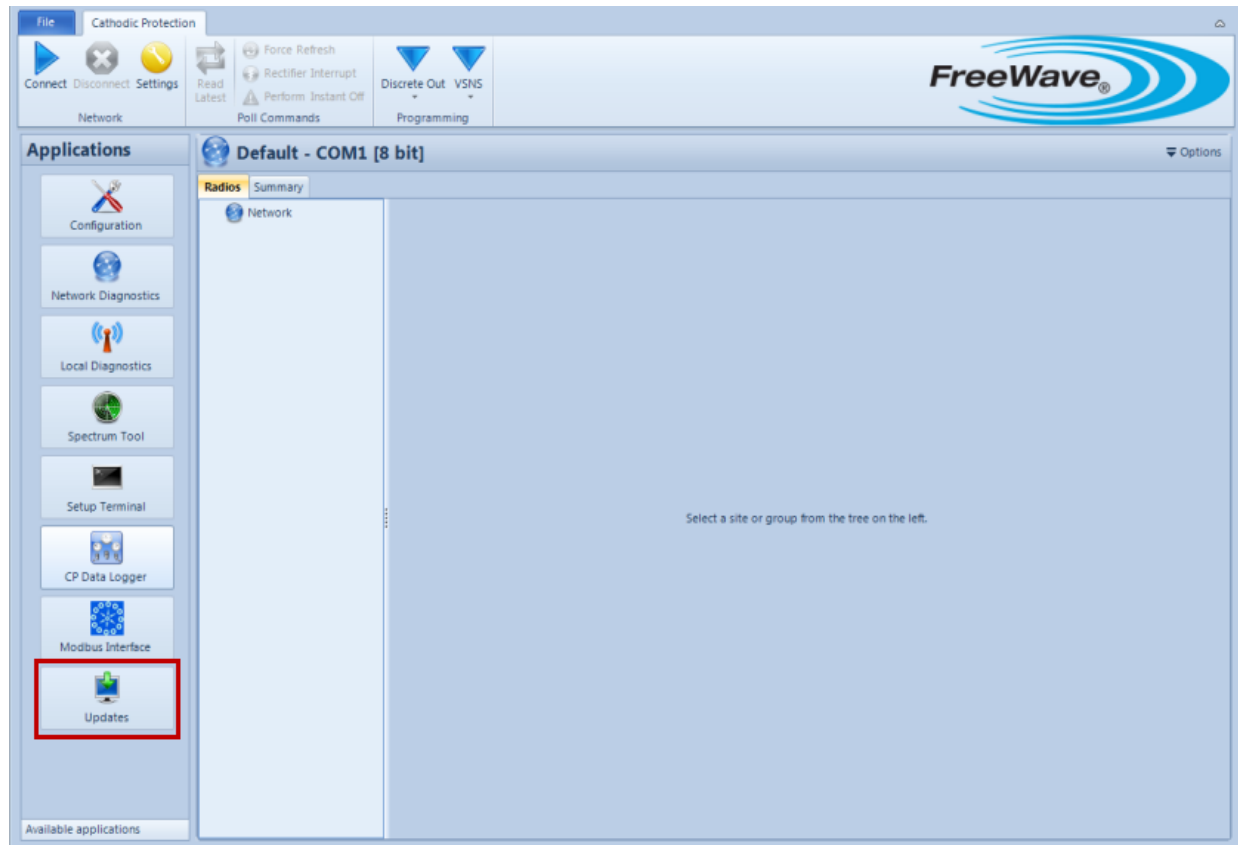
Use the Update application to review the most recent Tool Suite updates available and to update your version of the Tool Suite software.

From the Updates application you can do the following:

- Review the release notes for each upgrade version of the Tool Suite software. The Release Notes include all the information about additions and changes in each release of the Tool Suite application.
- Check to see if you are running the latest version of Tool Suite.
- Update to the most recent Tool Suite version.

Click **Updates** in the Applications pane to get started.

**Note:** After you have upgraded to version 2.8.5, any future upgrades make an automatic backup copy of your ToolSuite.sdf (all Configuration application data), ModPoller.sdf (all Modbus Interface data), and cpmu.sdf (all CP Data Logger data) files in the the C:\Program Files\FreeWave Technologies\Freewave Suite\backups directory.



## Updating Tool Suite at Program Startup

If you have an active Internet connection, when you start Tool Suite, it automatically connects to the FreeWave network to determine if you are running the latest version of the software. If there is a new version available, you are prompted about whether you want to update.

1. If a new update is available, when you open a Tool Suite session, a prompt displays informing you that new updates are available. To download the update, click **Yes** to display the Updates application.

To continue with Tool Suite without downloading the update, click **No**.

2. After the update downloads, Tool Suite prompts you to install the update. Click **Apply Updates** to install the updates in the Updates Application ribbon.

Tool Suite installs the updates, and re-launches after the install is complete.

## Updating Tool Suite From an Open Session

If you are currently running Tool Suite and want to install updates, review the release notes for the updates listed in the Update application and follow the steps below.

1. Click **Updates** in the Applications pane to display the Updates application.
2. Click **Check Updates** in the Updates ribbon.

A prompt displays indicating whether there are updates available to install.

3. If there are updates, click **Yes** to download the updates. Otherwise click **No** to exit without downloading the update.

When the download process is complete a message displays prompting you to apply the updates.

4. Click **OK** to close the prompt and click **Apply Updates** in the Updates ribbon.

Tool Suite applies the updates and re-launches after the install is complete.

## Updating Tool Suite Locally

To update Tool Suite on computers that do not have an active Internet connection, download the latest updates to a computer that has a network connection, and either distribute the installation file on a network drive, on a CD, or a drive that you can take into the field or carry throughout the office.

1. From a computer with an Internet connection, download the latest Tool Suite update from the FreeWave Web site at [www.freewave.com](http://www.freewave.com).
2. Save the update file to a folder on a local or network drive, portable drive, or CD for access later.
3. After the update file has been saved (if the package has been saved to a jump drive or CD, make sure the hardware is plugged into the computer or the CD with the update package is in the computer's CD-ROM), click **Updates** in the Application pane.
4. Click **Local Update** in the Updates ribbon.

Tool Suite opens the last folder that was accessed through the software. If you saved the update file in a different location, navigate to the correct directory, select the update file, and click **Open**.

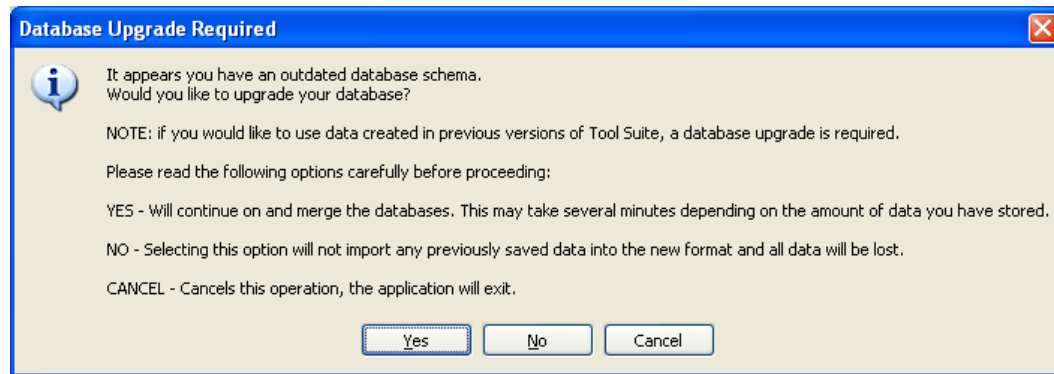
Tool Suite installs the updates, and re-launches after the install is complete.

## Upgrading Tool Suite from Versions 2.0.1.2 and Earlier

Due to database changes, if upgrading from Tool Suite version 2.0.1.2 or earlier you must merge your old database with the new database format. Tool Suite databases from versions 2.0.1.2 and below are not compatible with Tool Suite version 2.2 and above databases.

**Note:** Tool Suite versions 1.4.1 and below cannot upgrade to version 2.6 or above from the Updates application. To upgrade to the latest version, first un-install Tool Suite, then download the latest installer from the FreeWave customer support Web site or the *User Manuals and System Tools* CD.

1. Click **Updates** in the Applications pane to display the Updates application.  
If your system requires updates, "New updates are now available, would you like to download?" displays.
2. Click **Yes** to continue with the update process.
3. Click **OK** at the prompt that displays after the updates download.  
Another prompt displays asking to merge databases.



4. Do one of the following at the merge databases prompt:

- Click **Yes** to merge databases.
- Click **No** to upgrade Tool Suite without merging databases.

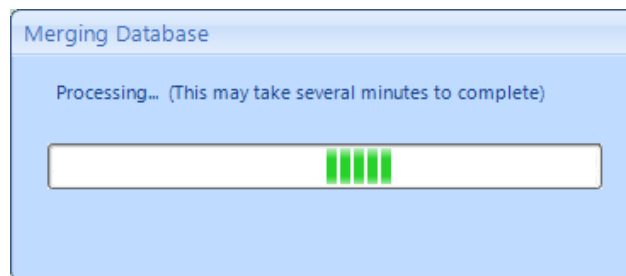
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**Important:** If you select **No** and continue to upgrade Tool Suite, all previously saved data will be lost after upgrade.

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- Click **Cancel** to exit without completing the upgrade.

If you select **Yes**, a status box displays while the databases are merging. The merge can take several minutes.



If you select **No**, Tool Suite restarts automatically.

After the merge is complete, Tool Suite restarts and then reloads automatically.



